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Economics of rotations and tillage systems for winter wheat production in southern Alberta

R.P. Zentner, C.W. Lindwall, and J.M. Carefoot[1]

Yields and economic returns for winter wheat grown in two-year, three-year, and continuous crop rotations, each managed using zero tillage and two methods of conventional tillage, are compared over a seven-year study period. The zero-tilled treatments generally outperformed the conventionally tilled treatments in years when growing-season rainfall was below normal and when grain prices were high. The two-year and three-year rotations were best under these same conditions. In years of favorable rainfall, zero tillage was less profitable than conventional tillage when the winter wheat was grown in rotations that included fallow; the converse was true when it was grown continuously. The difference in yield and economic performance between the two conventionally tilled treatments within each rotation group was generally small.

INTRODUCTION

Winter wheat production in western Canada has traditionally been restricted to southern Alberta and southwestern Saskatchewan, where it is usually grown on fallow or on tilled stubble in years when fall moisture is favorable. Winter wheat offers producers in this area several advantages over spring wheat. These include:

- higher and more stable yields because of its earlier maturity, which helps it to escape midsummer droughts and early fall frosts;
- greater protection for the soil from wind erosion during fall and winter periods; and
- higher economic returns and savings in costs of tillage and herbicides because of a shortened fallow period and the ability of winter wheat to compete effectively with summer annual weeds such as wild oats and green foxtail (Grant et al 1974; Zentner et al 1979).

Winter survival has not been a serious problem with winter wheat in the traditional growing area because of the moderating effect of Chinook winds on soil temperatures and the development of varieties such as Norstar with greater winter hardiness (Grant 1980). But in other areas of western Canada, low-temperature winterkill has been the major factor hampering expansion of winter wheat until recently, when the practice of zero-till seeding was developed (Fowler et al 1976; Fowler and Gusta 1979). Standing stubble traps snow, which helps maintain soil temperatures above the critical level necessary for winter wheat survival; it also improves soil protection, moisture conservation and grain yields, if weeds are adequately controlled (Lindwall and Anderson 1981; Brown and Black 1983).

One of the major weed problems in winter wheat production is the control of downy brome (Wicks et al 1984). This plant has a growth habit similar to that of winter wheat. Consequently, the potential for development of heavy infestations of downy brome is greatest when winter wheat is grown repeatedly on the same land. Since there are no registered herbicides available for control of downy brome in winter wheat, continuous winter wheat may have limited application in western Canada (Schwerdtle 1983).

Relatively little information exists about the economics of producing winter wheat in extended rotations and under zero-tillage management. Producer interest in these production options has grown in response to:

- declining costs of chemicals for zero-till situations, and
- new technology that has expanded the area where winter wheat production is technically feasible.

Furthermore, high winds in the fall and early spring of the past several years have created a growing interest in zero-tilled winter wheat as an improved means of erosion control.

The objective of this study was to compare net returns and resource needs for winter wheat production in southern Alberta, as influenced by tillage in two-year, three-year and continuous crop rotations. This paper complements one by

Carefoot and Lindwall (1981), which discussed the effects of these tillage and rotation treatments on weed growth, soil nutrient status, moisture conservation and grain yields.

DATA SOURCE AND METHOD OF ANALYSIS

Experimental data

The experiment was established in 1976 on a Dark Brown clay loam soil at the Agriculture Canada Research Station at Lethbridge, Alberta. Three winter wheat rotations, each with three tillage treatments, were set out on 18 plots. The rotation treatments were fallow-winter wheat (F-WW), fallow-winter wheat-barley (F-WW-B), and continuous winter wheat (Cont. WW). The tillage treatments referring to the main methods used to control weeds during the summerfallow period in the two-year and three-year rotations were:

- wide blade cultivator (Blade),
- heavy-duty sweep cultivator (Sweep),and
- herbicides only (Zero till).

For the continuous rotation, the tillage treatments (i.e., the first operation used for seedbed preparation) were:

- double disc (Disc),
- heavy-duty sweep cultivator, and
- herbicides only.

Seedbed preparation for the conventionally tilled plots generally consisted of two tillage operations, although from one to three operations were used occasionally. The first operation was performed in accordance with the tillage treatment specifications described above; a heavy-duty sweep cultivator was used if a second operation was required; the final operation was a rodweeder and packer combination. Zero-tilled plots received no seedbed preparation. Herbicides were applied as needed to the individual plots prior to planting for control of weeds and volunteer grains. In some years, herbicides were not applied; however, in most years paraquat was applied either alone or in combination with 2,4-D or bromoxynil plus MCPA (1:1). In recent years, glyphosate was used in place of paraquat.

Planting was done on all plots with a conventional hoe-press drill. Winter wheat was seeded at a rate of 67 kg/ha in early September and barley at a rate of 56 kg/ha in early May. An infestation of downy brome developed in the continuous winter wheat rotations by 1981 (Carefoot and Lindwall 1981), making it necessary to plant spring wheat in place of winter wheat during the 1982-84 period. The encroachment of downy brome into the two conventionally tilled F-WW treatments in 1983 also resulted in the replacement of winter wheat with spring wheat.

Fertilizer P (11-51-0) was placed with the seed at an average rate of 40 kg/ha P_2O_5. Fertilizer N (34-0-0) was usually broadcast in spring at average rates of 25, 56, and 63 kg/ha N for wheat on fallow, barley on stubble, and continuous wheat, respectively. In-crop weeds were controlled using recommended rates and combinations of herbicides such as diclofop methyl, bromoxynil, MCPA, and 2, 4-D (Alberta Agriculture 1986), although in several years none were required.

Plots were usually harvested in early August using the conventional swather-combine method except in years of below-normal rainfall when direct combining was used. The straw was uniformly distributed on the plots using a spreader attachment on the combine.

On plots that were summerfallowed using zero tillage, an average of 4.3 (range 3 to 6) herbicide applications were required for optimum weed control. Atrazine was applied after each harvest to provide residual weed control through part of the fallow period. For the remainder of the summerfallow season, weeds were controlled with paraquat or glyphosate. Other herbicides such as 2,4-D, bromoxynil plus MCPA (1:1), and dicamba were often used to supplement weed control by paraquat or glyphosate.

On conventionally tilled summerfallow plots, weeds were controlled by mechanical tillage in accordance with treatment specifications; herbicides were not used. The average number of tillage operations was 3.5 (range 3 to 5) using the wide blade cultivator and 3.1 (range 2 to 5) using the heavy-duty sweep cultivator.

Rainfall was measured at a meteorological site located 1 km from the test site.

Economic analysis

The economic performance of the winter wheat rotations and tillage treatments were extrapolated to the farm level with a whole-farm computer simulation model (Zentner et al 1978).

The model was modified to accommodate the specific types, sequences, and timing of field and tillage operations performed, types and amounts of N and P fertilizers and herbicides applied, and crop yields obtained in the experiment for each treatment. A 485-ha farm with a medium-age complement of machinery was selected for analysis. Data from the period 1977-78 to 1983-84 were analyzed in terms of levels and variability of net returns, cash flows, amount and seasonality of resource needs, machine investment requirements, and total and average unit costs of production. Net return was defined as the income remaining after paying for all cash costs, labor, and interest plus depreciation on buildings and machinery. Breakeven herbicide costs were also calculated for the zero-tillage treatments. These values represent the maximum expenditure that could be incurred for herbicides to control weeds so that equivalent net returns were earned with the zero-tilled and conventionally tilled treatments.

Various economic scenarios were examined, representing the conceivable limits of absolute and relative product prices and input costs (Table 1). The base situation reflects approximate prices and input costs in the 1986-87 crop year. These assumptions represent the base against which all other situations were compared. The effect of changes in product prices and selected input costs on net returns were examined for values ranging from 50% below to 50% above the base values. The effects of changes in the relative cost of nonrenewable energy were examined by adjusting the cost of all energy inputs (i.e., fuel, oil, lubricants, fertilizers, herbicides, building repairs, and machine manufacture and repairs) in accordance with their petroleum-based energy contents measured in diesel fuel equivalents (Jensen 1977).

All economic results are presented on a unit of cultivated land basis (i.e., they include the costs and returns for both the area seeded and the area summerfallowed in each rotation) and they are discussed for the two time periods 1978-81 (prior to the problems with downy brome) and 1982-84 (when spring wheat was substituted for winter wheat in some treatments).

Weather conditions

Precipitation received during September and October, which is important for proper germination and establishment of winter wheat in stubble situations, was below average in 1977, 1979, 1981 and 1983 (Table 2). Growing-season (May, June and July) rainfall was above average in 1978, 1980 and 1981; near average in 1982 and 1983; and well below average in 1979 and 1984.

TABLE 1 SUMMARY OF SELECTED ECONOMIC PARAMETERS

	Base situation	Range
Products ($/t)		
Winter wheat	147	73–221
Spring wheat	147	73–221
Barley	104	52–156
Inputs		
Fuel ($/L)		
– diesel	0.37	0.18–0.56
– gasoline	0.39	0.22–0.56
Fertilizer ($/kg)		
– N	0.58	0.21–0.95[1]
– P_2O_5	0.60	0.53–0.67[1]
Herbicides ($/kg AI)[2]		
– 2,4-D ester	7.40	6.57–8.23
– MCPA amine	7.10	6.56–7.64
– bromoxynil and MCPA (1:1)	20.75	19.54–21.96
– dicamba	43.75	42.11–45.39
– diclofop methyl	48.28	46.94–49.62
– glyphosate	71.20	69.62–72.78
– paraquat	35.60	33.90–37.30
Labor ($/hour)	10.00	–
Interest rate (%)	11.00	–

[1] For the effects of changes in fertilizer costs alone, the range in N and P_2O_5 costs were $0.29–$0.87 and $0.30–$0.90, respectively.

[2] AI = active ingredient

EFFECT OF ROTATION AND TILLAGE TREATMENT ON GRAIN YIELDS

On a seeded-area basis, yields of winter wheat on fallow during the 1978-81 period averaged 3427 kg/ha and were similar under the two-year and three-year rotations (Table 3). Yields of continuous winter wheat during the same four-year period averaged 2422 kg/ha, or 71% of fallow yields; yields of barley on stubble in the three-year rotation averaged 2638 kg/ha, or 77% of fallow wheat yields.

TABLE 2 AMOUNT AND DISTRIBUTION OF PRECIPITATION RECEIVED DURING THE STUDY (mm)

	September-October	May	June	July	Growing season	Total[1]
1977-78	42	113	18	120	251	671
1978-79	96	47	15	13	75	398
1979-80	31	131	37	28	196	404
1980-81	66	130	109	50	289	500
1981-82	25	27	58	87	172	343
1982-83	64	47	28	81	156	365
1983-84	20	24	51	20	95	246
Average	49	74	45	57	176	418
Long-term average	63	52	86	40	178	424

[1] September 1 to August 31

TABLE 3 AVERAGE SEEDED AREA YIELDS OF WHEAT AND BARLEY BY ROTATION AND TILLAGE TREATMENT

Rotation and tillage management	1978-81		1982-84	
	Yield	Comparison with check	Yield	Comparison with check
	(kg/ha)	(%)	(kg/ha)	(%)
Fallow				
F-WW				
Blade (check)	3357	100	1967 [1]	100
Sweep	3478	104	2226 [1]	113
Zero till	3626	108	2569	131
F-WW-B				
Blade	3317	99	2453	125
Sweep	3344	100	2652	135
Zero till	3438	102	3075	156
Stubble				
Cont. WW				
Disc	2314	69	611 [2]	31
Sweep	2321	69	545 [2]	28
Zero till	2631	78	649 [2]	33
sx[3]	87		79	
F-WW-B				
Blade	2566	76	1436	73
Sweep	2496	74	1435	73
Zero till	2851		1341	68
sx[4]	49		70	

[1] Includes the yield of spring wheat for 1983.
[2] Refers to yields of spring wheat.
[3] Overall standard error of mean wheat yields.
[4] Standard error of mean barley yields.

Crop yields were highest for the zero-tilled treatments during the 1978-81 period. There was no difference in yields between the conventionally tilled treatments within each rotation group. The yield increases with zero tillage were greatest in years of low fall precipitation and were attributed to higher soil moisture reserves at planting as a result of improved snow trapping by the upright stubble and reduced moisture losses by evaporation because the soil was not tilled (Carefoot and Lindwall 1987). The overall yield advantage of zero tillage, compared with conventional tillage during the first four-year period, was 6.1% for winter wheat on fallow in the two-year rotation and 3.2% for winter wheat on fallow in the three-year rotation. On stubble, the average yield advantage of zero tillage was 13.5% for winter wheat in a continuous rotation and 12.6% for barley in a three-year rotation. These results are comparable with those reported for minimum and zero-tilled spring wheat in southern Alberta (Zentner and Lindwall 1978; Lindwall and Anderson 1981).

During the 1982-84 period, yields of winter wheat on fallow in the F-WW-B rotation averaged 2727 kg/ha and yields of barley on stubble averaged 1404 kg/ha. The lower grain yields obtained during this period, compared with those during 1978-81, reflect the lower levels of precipitation that were received (Table 2). Yields of spring wheat when substituted for winter wheat in a continuous rotation averaged only 602 kg/ha. As for the earlier period, grain yields for zero tillage were generally as high as or higher than those for conventional tillage.

NET RETURNS, BASE SITUATION

Net returns for the 1978-81 period were similar and were highest for the F-WW and Cont. WW rotations and lowest for F-WW-B (Table 4). As for yields, there was no effect on net returns as a result of method of conventional tillage, but there were significant differences in net returns between conventional and zero-tillage management. For rotations that included fallow, conventional tillage was generally more profitable than zero tillage (the average was $14/ha higher) primarily because of lower costs when mechanical tillage was used on fallow areas compared with use of herbicides alone. In contrast, when winter wheat was grown continuously for four years, zero tillage produced higher net returns than conventional tillage (the average was $33/ha more).

TABLE 4 AVERAGE ANNUAL NET RETURN BY ROTATION AND TILLAGE TREATMENTS FOR BASE ASSUMPTIONS ($/ha)

Rotation and tillage management	1978-81	1982-84
F-WW		
Blade	78	–27
Sweep	88	–5
Zero till	69	19
Mean	78	–4
F-WW-B		
Blade	43	–13
Sweep	46	–2
Zero till	31	12
Mean	40	–1
Cont. WW		
Disc	73	–177
Sweep	76	–187
Zero till	107	–166
Mean	85	–177
$s_{\bar{x}}$[1]	6.9	5.0
Average		
Blade	65	–72
Sweep	70	–65
Zero till	69	–45

[1] Standard error of the mean.

During 1982-84, when growing-season rainfall was below normal in all years and when high infestations of downy brome made it necessary to plant spring wheat in place of winter wheat in some treatments, net returns were generally similar and were highest for the two-year and three-year rotations, but they were much lower and negative for continuous cropping (Table 4). Furthermore, zero tillage produced higher net returns (or lower losses) than conventional tillage within all rotation groups, which reflects the higher soil moisture conserved on these areas. Net returns were also lower for the wide blade cultivator than for the heavy-duty sweep cultivator treatment in the F-WW rotation and, to a lesser extent, in the F-WW-B rotation. This difference was due to the lower revenue obtained when the wide blade cultivator was used because of:

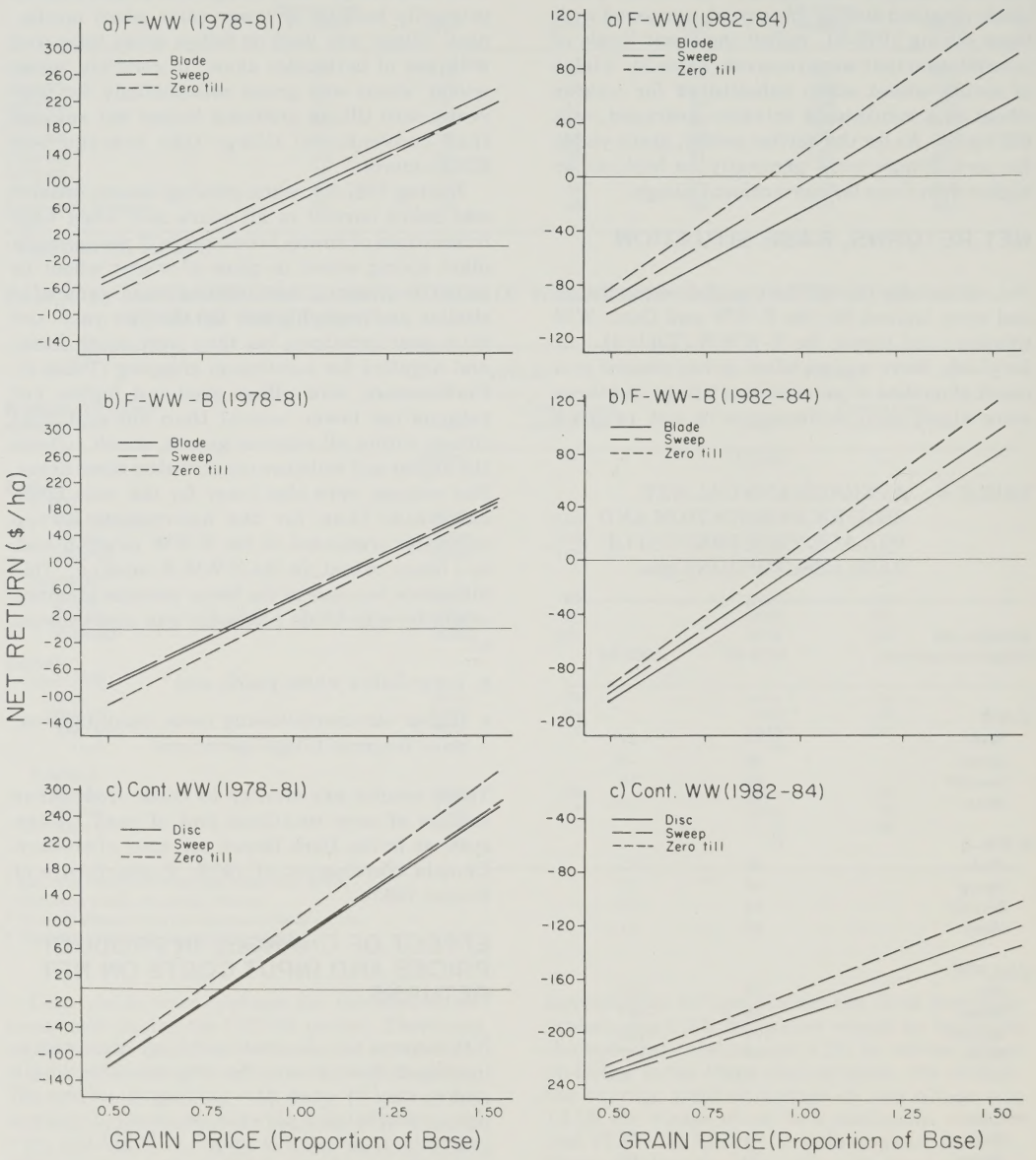
- lower fallow wheat yields, and
- higher summerfallowing costs resulting from more frequent tillage operations.

These results are similar to those from other studies of crop rotations and of zero tillage systems in the Dark Brown soil zone of western Canada (Zentner et al 1979; Rutherford and Fowler 1983).

EFFECT OF CHANGES IN PRODUCT PRICES AND INPUT COSTS ON NET RETURNS

Net returns for all rotation-tillage treatments increased directly with the price level for wheat and barley (Figure 1). During the 1978-81 period, F-WW provided the highest net return for grain prices below 90% of base levels. Alternatively, at higher grain prices, zero-tilled Cont. WW was the most profitable system. The treatments that ranked second highest in terms

FIGURE 1 EFFECT OF CHANGES IN GRAIN PRICES ON THE NET RETURNS FOR ROTATION/TILLAGE TREATMENTS BY PERIOD

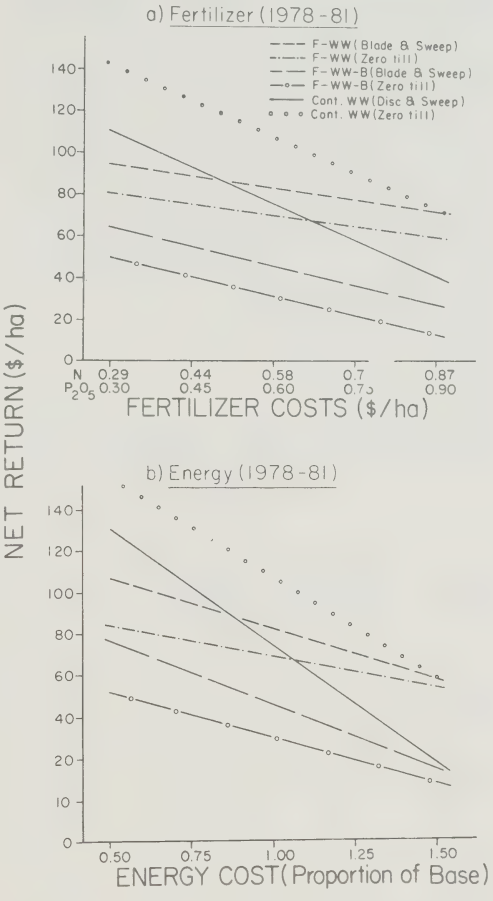


of net returns were zero-tilled F-WW when grain prices were low, and conventionally tilled Cont. WW when grain prices were high. The F-WW-B treatments were economically competitive with those for the comparable tilled F-WW and Cont. WW treatments only when the ratio of barley price to wheat price was greater than 0.95. All rotation-tillage treatments produced economic losses when grain prices were below 65% to 90% of base levels; the critical price levels were generally lowest for the two-year rotation treatments.

During the last three years of the study, zero-tilled F-WW and F-WW-B were the most profitable treatments at all grain prices (Figure 1). These same rotations, but with the heavy-duty sweep cultivator method of tillage management, ranked second highest. Net returns were generally negative for the F-WW and F-WW-B treatments when grain prices were 90% to 115% of base levels in this period, while the continuous rotation treatments showed sizable economic losses at all grain price levels. The F-WW-B treatments were more profitable than the F-WW treatments when the barley/wheat price ratio was greater than 0.70.

Net returns for the rotation-tillage treatments were inversely related to the cost of inputs, with the relative effects being greatest for those treatments that utilized greater amounts of that input. For example, a 50% decrease in the cost of N and P fertilizer from the base levels increased net returns by an average $12/ha for the two-year rotation, $19/ha for the three-year rotation, and $35/ha for continuous cropping. There was no differential effect due to tillage method since each rotation was fertilized similarly. During the 1978-81 period and for all fertilizer costs lower than the maximum values considered, the most profitable treatment was zero-tilled Cont. WW and the least profitable treatment was zero-tilled F-WW-B (Figure 2a). The conventionally tilled Cont. WW treatments ranked second highest when fertilizer costs were less than 80% of the base values, while the conventionally tilled F-WW treatments generally ranked second highest at higher fertilizer costs. Changes in fertilizer costs generally had similar relative effects on the levels of net return for the rotation tillage treatments during 1982-84 as for the earlier period, but here zero-tilled F-WW and zero-tilled F-WW-B were the most profitable treatments. At low fertilizer costs, zero-tilled F-WW-B had a small economic advantage over zero-tilled F-WW as the treatment with the highest net return but, at high fertilizer costs, the converse was true (data not shown).

FIGURE 2 EFFECTS OF CHANGES IN COSTS OF FERTILIZER AND NONRENEWABLE ENERGY ON NET RETURNS, 1978-81



A decrease in the cost of nonrenewable energy increased net returns relatively more for continuous cropping and for conventionally tilled methods of management, while increases in energy costs favored F-WW and use of zero-tillage

management (Figure 2b). This occurs because nonrenewable energy needs are higher for the more intensive crop rotations and for the conventional tillage methods of management (Narayanan et al 1983; Zentner et al 1984). Nevertheless, the results of the most profitable production systems for 1978-81 (Figure 2b) and 1982-84 (data not shown) were not very different from those for the base situation. The major effect of energy cost changes for the 1978-81 period occurred in the production system that ranked second highest. For energy costs below 85% of the base levels, conventionally tilled Cont. WW provided the second-highest net return, while at higher energy costs conventionally tilled F-WW ranked second highest. In the later time period and when energy costs were below about 75% of the base values, net returns for the conventionally tilled systems were generally similar to those earned with zero tillage in both the F-WW and F-WW-B rotations but, at higher energy costs, zero tillage was more profitable than conventional tillage for both rotations (data not shown).

COSTS OF PRODUCTION

Cash costs (including labor) per unit area of land increased as the proportion of summerfallow in the rotation decreased, and were higher for zero tillage than for conventional tillage (Table 5). Over the seven-year study period, cash costs averaged 24% more for the three-year rotation and 96% more for continuous cropping than for the two-year rotation. Zentner et al (1979) and Schoney (1985) report similar relative cash cost differences among spring-seeded crop rotations of these lengths.

The use of zero tillage, compared with conventional tillage management in the F-WW rotation, increased cash costs by 63% during 1978-81 and by 28% during 1982-84 (Table 5). The greater use of herbicides with zero tillage was offset to some extent by savings in fuel and oil, machine repair, and labor (Table 6). The lower herbicide costs with zero tillage in the 1982-84 period were due to the fewer number of weeds on fallow areas because of drought and the use of more cost-efficient herbicide combinations. Cash costs for the zero-tilled three-year rotation averaged 47% more than those for the comparable conventionally tilled rotation during 1978-81, and 30% more during the 1982-84 period. For continuous cropping with zero tillage, cash costs averaged 16% and 10% more than with conventional tillage in the two periods, respectively. Relatively small cost increases when zero tillage was used with continuous cropping have also been reported for spring wheat in southern Alberta (Zentner et al 1978).

TABLE 5 AVERAGE ANNUAL COSTS PER UNIT OF LAND BY ROTATION/TILLAGE TREATMENT ($/ha)

Rotation and tillage management	1978-81 Cash costs and labor[1]	1978-81 Fixed costs[2]	1978-81 Total costs	1982-84 Cash costs and labor[1]	1982-84 Fixed costs[2]	1982-84 Total costs
F-WW						
Blade	87	85	172	91	81	172
Sweep	85	82	167	87	79	166
Zero till	140	61	201	114	58	172
F-WW-B						
Blade	122	90	212	100	86	186
Sweep	118	87	205	96	84	180
Zero till	176	64	240	127	60	187
Cont. WW						
Disc	191	95	286	186	89	275
Sweep	192	91	283	187	84	271
Zero till	222	68	290	204	59	263

[1] Labor valued at $10 an hour.
[2] Includes interest and depreciation on machinery and buildings, but excludes all ownership costs associated with land.

TABLE 6 EXPENDITURES FOR SELECTED INPUTS BY ROTATION/TILLAGE TREATMENT ($/ha)

Rotation and tillage management	1978-81				1982-84			
	Herbicides	Fuel and oil	Machine repair	Labor[1]	Herbicides	Fuel and oil	Machine repair	Labor[1]
F-WW								
Blade	4	13	10	21	10	13	9	20
Sweep	4	12	9	21	10	12	8	19
Zero till	61	9	7	19	47	8	6	16
F-WW-B								
Blade	6	17	13	28	2	15	11	24
Sweep	6	16	12	27	2	14	10	23
Zero till	65	11	10	24	37	10	8	20
Cont. WW								
Disc	14	19	17	34	35	16	14	27
Sweep	14	18	18	35	35	16	15	27
Zero till	51	14	14	30	57	13	13	24

[1] Labor valued at $10 an hour.

Fixed costs (i.e., interest and depreciation on buildings and machinery) increased by 5% to 10% with increases in the rotation length and averaged 28% lower with zero tillage, compared with conventional tillage (Table 5). This latter effect was due to the reduced investment requirements in tillage equipment and large tractors when zero tillage was used.

Total costs (cash plus fixed costs) averaged 8% to 22% higher for the three-year rotation and about 60% higher for continuous cropping than for the two-year rotation (Table 5). The combination of lower fixed costs but higher cash costs for zero tillage compared with conventional tillage resulted in total costs that were often similar for the various tillage methods within each rotation group.

The cost per tonne of wheat produced displayed generally similar patterns as the cost per unit area of land (Table 7). The unit cash and total cost of producing wheat increased as cropping intensity increased, were often similar for methods of tillage, and were lower in 1978-81 than in 1982-84 because of higher grain yields. Because of the low yields due to drought, the unit costs for continuous spring wheat in the later period were much higher than these reported elsewhere (Schoney 1985).

TABLE 7 AVERAGE COST PER UNIT OF WHEAT PRODUCED BY ROTATION/TILLAGE TREATMENT ($/t)

Rotation and tillage management	1978-81		1982-84	
	Cash cost and labor	Total cost	Cash cost and labor	Total cost[1]
F-WW				
Blade	52	102	93	175
Sweep	49	96	78	149
Zero till	77	111	89	134
Cont. WW				
Disc	83	124	304	450
Sweep	83	122	343	497
Zero till	84	110	314	408

[1] Includes cash costs and labor plus interest and depreciation on machinery and buildings.

BREAKEVEN COSTS FOR HERBICIDES UNDER ZERO TILLAGE MANAGEMENT

The maximum allowable herbicide expenditure that could be made to control weeds in the zero tillage systems increased with the price for wheat (Table 8). Herbicide costs incurred for these purposes averaged $57/ha during 1978-81 and $37/ha during 1982-84 for zero-tilled F-WW. Similarly, for the zero-tilled F-WW-B treatment herbicide costs averaged $59/ha and $35/ha in the respective periods, while for zero-tilled Cont. WW they averaged $37/ha and $22/ha. Costs for F-WW and F-WW-B in 1978-81 were generally lower than the breakeven values for all but the very highest grain prices considered. In contrast, those for F-WW and F-WW-B in 1982-84 and for Cont. WW in both periods were above the breakeven values at all grain price levels. Herbicide costs lower than the breakeven values imply that zero-tillage cropping is more profitable than conventional tillage cropping, while costs higher than breakeven imply the opposite.

TABLE 8 MAXIMUM ALLOWABLE HERBICIDE EXPENDITURES FOR HERBICIDES WITH ZERO TILLAGE MANAGEMENT ($/ha)

Rotation and period	Expected wheat price ($/t)				
	73	110	147	184	221
F-WW					
1978-81	29	36	43	48	53
1982-84	51	60	69	80	91
F-WW-B					
1978-81	32	39	46	52	57
1982-84	41	48	55	61	67
Cont. WW					
1978-81	49	60	70	80	90
1982-84	33	36	38	42	45

CONCLUSION

This study has examined the economics of producing winter wheat in two-year, three-year and continuous crop rotations using zero tillage and two methods of conventional tillage. The results show that the economic performance of the zero-tilled production systems are generally quite favorable. Net returns are often similar or higher with zero tillage than with conventional tillage. The economic advantage of zero tillage is particularly evident in years when growing-season rainfall was low and when grain prices were expected to be high. When growing-season rainfall was favorable, zero tillage was usually less profitable than conventional tillage when the winter wheat was grown in rotations that included fallow, but the converse was true when winter wheat was grown continuously and downy brome infestations were low. The relatively poor economic performance of the zero-tilled fallow rotations under these conditions was due primarily to the high costs of weed control on fallow areas.

Zero tillage offers producers some savings in fuel, machine repairs, labor, and machine investment costs. However, the high cash outlay for herbicides offsets much of these resource savings, including the increased revenue from higher yields. This, combined with additional management skills required for proper herbicide application, may be a limitation for adoption of zero tillage production methods, especially when grain prices are low, when operating capital is limited, or when soil conservation is not a prime concern. For producers who prefer to use conventional production methods for winter wheat, there is generally little difference in economic performance between the heavy-duty sweep cultivator and wide blade cultivator systems; however, the latter method is recommended because of the better soil erosion protection it provides in fallow rotations.

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Canada's beef and veal trade: 1966 to 1986

Janice Dyer[1]

INTRODUCTION

Canada's cattle industry is diverse. It encompasses a wide range of enterprises from breeding through feeding and is one of the largest sectors of the food industry. The cow/calf industry comprises extensive feeding of cattle that are grazed on rangeland and arable grasslands as well as marginal land as they efficiently convert plant material into high-quality human food. The feeding sector also includes highly intensive feeding of cattle that are finished on high-energy rations of grain. This type of grain-fed cattle is unique to North America and so the beef produced from these animals is preferred in the North American diet over that produced in other countries from grass-fed cattle.

The productivity of the Canadian beef cow herd has improved markedly in the last 20 years. The introduction of exotic breeds and intensive selection has resulted in improved feeding and reproductive efficiency. Better breeding and feeding technology aided by a grading system that favors lean beef has resulted in a Canadian product that meets the requirements of today's consumer. These efficiency gains have meant that more and more beef has been produced from a smaller cow herd. In turn, Canada's ability to produce beef in excess of domestic requirements has improved and continues to improve, resulting in an excess supply in most years that is available for export.

Trade in beef and veal has always played an important role within the Canadian agriculture sector. In 1986 cattle, beef and their by-products (offals, hides and tallow) were Canada's third most important agricultural export behind wheat and hogs and pork. As Canada looks to expanding exports of beef and veal, it is important to look at the international environment we face as a trader in beef and veal. The major producers of beef and veal are North America, the EEC, the USSR, South America and Oceania (Australia and New Zealand). All of these countries are expanding or at least are maintaining production. Major consumers on a per-capita basis of beef and veal are Argentina, the United States, Oceania, Canada, the EEC and the USSR. Many of the larger consuming countries have experienced drops in per-capita consumption since the high levels in the late 1970s. Major exporting regions are Oceania, the EEC, South America and North America and major importers are the U.S., the USSR, the EEC, the Middle East and Egypt, Japan, and Canada. Canada and the U.S. export about the same amount in most years, with the U.S. being slightly ahead on a volume basis.

Health regulations, domestic policies and consumer preferences effectively prevent trade between many countries. The EEC (except Denmark and Ireland) and South America, because they are not free of contagious diseases like foot-and-mouth disease, cannot trade with those countries who are free such as Canada, the U.S., Oceania and Japan (Lattimore and de Gorter 1980). Canada's good health status means that we are not prevented from exporting to any country because of disease. However, the policies of the EEC and the associated high levies and tariffs on imports severely limit trade with countries outside the common market. In other countries, such as Australia and New Zealand, consumers prefer grass-fed beef and find North American beef too fat, while other countries simply do not have high enough incomes to purchase grain-fed beef from North America. This means that Canada's major markets are the U.S. and Japan while our major competitors are the Oceanic countries.

Over the past 20 years, the international community has seen progressive increases in trade liberalization. Successive rounds of negotiations within the General Agreement on Tariffs and Trade (GATT) have reduced tariffs significantly and have substantially improved the opportunities for trade. If passed, the recently completed free trade agreement (FTA) between Canada and the U.S. will eliminate all tariffs in beef and veal and will significantly reduce nontariff barriers by 1998. This will virtually assure access to the large U.S. market for Canadian beef and promises to enhance trade even further between Canada and the U.S.

Trade with the U.S. is extremely important because of the regional distribution of Canada's livestock and human populations. Eastern Canada has the largest percentage of the human population, but more than 80% of the cow herd is located in western Canada. At least 30% of cattle-feeding activity takes place in eastern Canada so it has always been necessary for eastern Canada to import feeder cattle and beef from western Canada. Distances between the trading regions of Canada are greater than those to the U.S. and so transportation costs between the two regions of Canada are higher than the transportation costs between either eastern Canada and the eastern U.S. or western Canada and the western U.S. Trucking rates to points in the U.S. are also lower because of assured backhaul of produce. For example, rates on loads of 44,000 pounds from Saskatoon to Los Angeles are quoted at about 6 cents per pound while rates from Saskatoon to Toronto are approximately 11 cents per pound. There has always been some north-south trade between western Canada and the western U.S. and eastern Canada and the eastern U.S., but north-south trade is even more attractive now because of relative transportation costs. This means that, as trade liberalized and relative transportation costs changed, north-south trade increased at the expense of east-west trade. So over time, trade volumes have increased to the U.S.

Another factor influencing trade is the exchange rate. In the past 20 years, restrictions on exchange rate fluctuations have been removed and the exchange rate system has gone from the fixed exchange rates to free floating "managed" rates, in Canada's case. Since exchange rates have been allowed to float, the Canadian dollar has depreciated against the U.S. dollar and other currencies. This has made Canadian products more competitively priced and has increased exports. Studies that have been done estimate that the dollar's depreciation has had a major impact on the trade in red meat with the U.S. (Meilke and Coleman 1986). It has been estimated, using this study, that half of the increase in the trade balance in the last 10 years is attributable to the effect of the exchange rate (Pugh 1987).

These factors indicate an opportunity to increase Canada's beef and veal trade, provided that there are no significant changes in relative exchange rates. It is useful then to review the changes that have taken place in Canada's beef and veal trade, over the past two decades. A profile of beef and veal trade was undertaken in the mid-1970s and it provided a summary of the trade situation when Canada was a net importer (Boswell 1973). A review of the trade profile since then and the factors contributing to changes in the trade balance provide an insight into what will influence trade opportunities in the future.

IMPORTANCE OF TRADE IN THE CATTLE AND BEEF SECTOR

The percentage of farm cash receipts coming from exports is an indicator of the importance of trade to cattle producers . In the mid-1960s exports accounted for a small percentage of the value of trade in beef and veal, but since the early 1970s this has steadily increased to the point where exports now account for about 20% of farm cash receipts from cattle and calves. Imports on the other hand have remained at about 10% of farm cash receipts since the early 1970s (Table 1).[2] The total value of trade, both exports and imports, in cattle, beef and veal and their products has steadily increased since the mid-1960s (Figure 1).

FIGURE 1 TOTAL VALUE OF EXPORTS AND IMPORTS OF BEEF AND VEAL (LIVE AND PRODUCT)

Canada has enjoyed a trade surplus in most years, with the exception of the period from 1971 to 1975, the only period when the U.S. dollar averaged below the Canadian dollar and also the period of the Nixon price freeze. Since that period, trade irritants have lessened, the Canadian dollar has depreciated and domestic policies have become less restrictive. The result

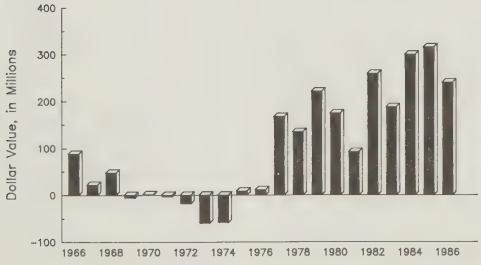
TABLE 1 FARM CASH RECEIPTS FROM CATTLE AND CALVES, AND VALUE OF FOREIGN TRADE IN BEEF AND VEAL, 1966-86

	Farm cash receipts	Total value of exports	Exports as a share of FCR	Total value of imports	Imports as a share of FCR
	($000)	($000)	(%)	($000)	(%)
1966	913 177.0	122 844.2	13	35 000.4	4
1967	918 125.0	67 821.9	7	46 085.0	5
1968	957 978.0	88 256.5	7	40 760.6	4
1969	967 159.0	83 693.8	9	90 273.3	9
1970	975 962.0	104 242.5	11	102 748.4	11
1971	1 072 520.0	104 301.5	10	108 121.8	10
1972	1 285 250.0	132 427.8	10	151 170.7	12
1973	1 593 190.0	218 113.5	14	278 581.6	17
1974	1 752 320.0	147 525.5	8	206 636.1	12
1975	1 874 540.0	142 810.3	8	134 540.2	7
1976	1 909 260.0	249 849.2	13	238 836.1	13
1977	2 081 370.0	304 588.6	15	137 490.8	7
1978	2 893 420.0	369 319.3	13	234 399.8	8
1979	3 502 180.0	500 281.8	14	279 217.3	8
1980	3 647 860.0	474 867.9	13	300 433.0	8
1981	3 500 920.0	466 707.9	13	374 504.8	11
1982	3 500 920.0	562 747.7	16	304 091.4	9
1983	3 426 370.0	525 293.3	15	337 702.6	10
1984	3 517 830.0	689 272.8	20	390 142.0	11
1985	3 592 056.0	682 598.0	19	367 757.0	10
1986	3 643 781.0	651 816.0	18	412 414.0	11

Source: Statistics Canada, External Trade Division, cat. no. 21-202, 65-004 and 65-007.

is that both exports and imports have steadily increased. The trade balance, though, has widened significantly in favor of Canada (Figure 2). Most of the growth in this trade balance has been a result of increases in exports to the U.S.

FIGURE 2 TOTAL BALANCE IN BEEF AND VEAL (LIVE AND PRODUCT)



COMPONENTS OF TRADE IN THE SECTOR

Canada's trade balance in beef and veal is comprised of many components, including live cattle and calves, beef and veal, cured and canned beef, hides, offals and tallow. This reflects the supply and demand for different products domestically and in the export market. Beef is differentiated into two basic products: high-quality cuts (table beef) and manufacturing-quality beef used for grinding and further processing.

Canada both imports and exports manufacturing beef. This apparent anomaly can be easily explained in the following way. Imports from offshore are primarily frozen, boneless cuts used for further processing, while exports to the U.S. are primarily fresh cuts. Offshore product, which is imported at competitive prices, to some extent displaces Canadian manufacturing beef into the U.S. (McClatchy and Cluff 1986). Canada also exports cull cows from the beef and dairy herds to the U.S. for manufacturing beef production. The

demand for high-quality beef exceeds available supplies, particularly in eastern Canada, and so finished cattle for slaughter and high-quality cuts are imported from the U.S. Factors affecting trade in each of these components include relative prices, packing capacity, transportation rates and exchange rates.

Canada enjoys an overall trade surplus when all components of trade are tallied. We are a net exporter of all components, except fresh and frozen beef and veal, and canned beef (Table 2). If we assume that the 1971 to 1975 period is not representative because of U.S. policies and exchange rates, then we can predict that the trade patterns currently prevailing for Canada may be expected in the future, assuming a liberalized trading environment and an exchange rate close to that prevailing since the early 1980s. Since Canada exports only small volumes of beef to other countries, when all components of trade are considered, the most important determinant of the overall trade pattern is the trade balance with the U.S.

TRADE IN LIVE CATTLE AND CALVES

Canada is a net exporter of live cattle calves, and almost all of this trade is with the U.S. (Figure 3). Some trade in live purebred animals takes place with other countries, but this is a very small part of the trade in live animals. Exports have steadily increased in the past 10 years, if allowance is made for occasional fluctuations in supply, while imports have generally remained low, with the exception of 1981. Cattle are exported to the U.S. for three basic purposes: veal calves (under 200 pounds), feeder calves (200 to 700 pounds) and slaughter cattle (700 pounds and over) (Table 3).

Canada's trade in veal calves from 1966 until recently was fairly constant. The exception was in 1975, when exports of veal calves dropped significantly as high prices for feeder calves bid them away from the export trade and into feedlots for finishing. Since 1983, a series of policy changes in the U.S. dairy industry, from support price reductions in 1983 to the 1986 Dairy Termination Program, has reduced U.S. demand for imported veal calves, and our exports dropped accordingly.

Feeder cattle exports fluctuate considerably with changes in feedgrain prices. This is because, in a competitive industry where producers are the only purchasers of a particular input, the industry is able to adjust the price of inputs over which it has control, thereby "bidding away" potential profits or losses (Pugh 1986). The feedlot industry as the sole user of feeder cattle is able to bid more or less for these cattle when feedgrain prices or slaughter cattle prices change.

FIGURE 3 TOTAL EXPORTS AND IMPORTS OF LIVE ANIMALS FOR BEEF AND VEAL PURPOSES

If information was perfectly relayed, prices between Canada and the U.S. would move together closely, and they do most of the time. However, there are some time lags between price changes in the U.S. for feedgrain and feeder cattle and those in Canada. When this occurs, the price spread between Canada and the U.S. for feeder cattle may change. If the relative price changes favor the U.S., Canadian feeder cattle will flow across the border to the U.S., but it is not as easy for the reverse to occur because of various Canadian animal health regulations affecting the importation of feeder cattle. The net result is that, when feedgrain prices drop, exports temporarily rise. When relative prices adjust, exports fall back to normal levels.

Slaughter cattle exports, which consist mostly of cows for manufacturing beef production, more than doubled after 1974 when U.S. import bans, put in place at the time of the price freeze were lifted. When put in place, the bans applied to live cattle and dressed beef. Those on live animals were lifted, while those on dressed beef remained. This allowed live cattle to move to the U.S. for manufacturing beef production, resulting in a large jump in exports. This increase in exports

TABLE 2 CANADIAN TRADE BALANCE IN BEEF AND VEAL (LIVE AND PRODUCT), ALL COUNTRIES, 1966-86 ($ million)

	Live cattle			Beef and veal			Cured beef			Canned beef and veal		
	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Balance
1966	52.7	3.3	49.4	26.4	8.0	18.4	0.9	5.2	–4.3	–	3.8	–
1967	20.1	10.1	10.1	14.4	14.2	0.2	0.6	5.9	–5.3	–	5.2	–
1968	33.0	3.3	30.6	23.7	14.4	9.3	1.0	5.6	–4.6	–	4.3	–
1969	23.2	4.6	18.7	26.4	59.9	–33.5	1.0	4.8	–3.8	–	6.7	–
1970	20.7	16.7	4.0	48.5	63.9	–15.4	1.4	4.4	–3.0	–	6.0	–
1971	20.7	26.6	–5.9	47.0	58.0	–11.0	1.1	5.7	–4.6	–	5.7	–
1972	35.2	28.9	6.3	39.5	88.9	–49.4	2.3	6.4	–4.1	–	8.1	–
1973	82.4	111.8	–29.4	56.5	133.6	–77.1	2.8	5.7	–2.9	–	7.1	–
1974	36.5	80.8	–44.4	28.8	97.5	–68.7	1.7	1.6	0.2	–	9.6	–
1975	47.7	39.2	8.5	16.4	72.3	–55.9	2.5	0.0	2.5	–	8.4	–
1976	84.4	69.2	15.1	57.5	133.7	–76.2	3.3	0.4	2.9	–	11.5	–
1977	108.1	13.8	94.3	53.8	88.2	–34.4	1.5	0.6	1.0	–	11.9	–
1978	130.4	37.0	93.4	64.6	147.5	–82.9	3.8	0.6	3.2	–	12.5	–
1979	150.1	21.2	129.0	106.6	182.4	–75.7	2.9	0.4	2.5	–	13.3	–
1980	149.2	60.4	88.8	123.2	177.3	–54.1	4.1	0.7	3.3	–	14.3	–
1981	134.1	135.3	–1.1	142.9	178.8	–36.0	3.4	2.7	0.8	–	14.1	–
1982	195.5	70.4	125.1	157.8	175.9	–18.0	3.2	3.4	–0.1	–	16.9	–
1983	173.7	73.0	100.7	150.5	189.3	–38.8	3.0	3.0	0.0	–	17.2	–
1984	218.9	35.8	183.0	190.6	277.2	–86.6	2.8	2.6	0.2	–	13.5	–
1985	212.6	50.5	162.1	218.1	256.2	–94.1	3.0	2.1	0.8	–	15.6	–
1986	177.1	91.4	198.7	218.8	260.2	–37.4	2.8	2.5	0.3	–	11.0	–

	Hides			Tallow			Total		
	Exports	Imports	Balance	Exports	Imports	Balance	Exports	Imports	Balance
1966	31.8	13.9	17.0	11.1	0.8	10.2	122.8	35.0	87.8
1967	23.1	10.0	13.1	9.6	0.6	9.0	67.8	46.1	21.7
1968	20.4	11.5	8.9	9.2	1.7	7.5	88.3	40.8	47.5
1969	23.2	13.2	10.0	9.9	1.1	8.8	83.7	90.3	-6.6
1970	18.4	9.7	8.7	15.3	2.1	13.2	104.2	102.7	1.5
1971	16.6	10.3	6.3	18.9	1.9	17.0	104.3	108.1	-3.8
1972	38.9	17.4	21.5	16.5	1.5	15.0	132.4	151.2	-18.7
1973	52.3	19.4	32.9	24.1	1.0	23.1	218.1	278.6	-60.5
1974	40.0	15.7	24.3	40.5	1.5	39.1	147.5	206.6	-59.1
1975	43.7	14.2	29.5	32.6	0.5	32.1	142.8	134.5	8.3
1976	67.2	23.7	43.5	37.5	0.3	37.2	249.8	238.8	11.0
1977	86.3	22.8	63.5	54.9	0.2	54.6	304.6	137.5	167.1
1978	104.8	36.6	68.3	65.7	0.2	65.5	369.3	234.4	134.9
1979	145.9	61.0	85.0	94.6	1.0	93.6	500.3	279.2	221.1
1980	110.7	46.3	64.4	87.7	1.5	86.2	474.9	300.4	174.4
1981	97.6	42.3	55.3	88.7	1.3	87.4	466.7	374.5	92.2
1982	126.9	36.3	90.6	79.2	1.2	78.0	562.7	304.1	258.7
1983	126.8	53.1	73.7	71.3	2.1	69.2	525.3	337.7	187.6
1984	181.0	56.6	124.4	96.0	4.4	91.6	689.3	390.1	299.1
1985	157.7	40.7	117.0	90.6	2.7	87.9	682.6	367.8	258.1
1986	208.4	44.3	164.1	64.9	3.0	61.9	651.8	412.4	239.4

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 3 CANADIAN EXPORTS OF LIVE CATTLE AND CALVES FOR BEEF AND VEAL PURPOSES, 1966-86

	Under 200 pounds				200 to 700 pounds			
	U.S.		All countries		U.S.		All countries	
	(000 head)	($000)	(000 head)	($000)	(000 head)	($000)	(000 head)	($000)
1966	105.8	3 023.5	106.0	3 034.5	282.2	29 819.3	282.3	29 831.1
1967	86.1	2 332.5	86.3	2 339.5	119.9	12 004.8	119.9	12 011.8
1968	137.4	3 901.1	137.6	3 909.7	112.6	12 869.6	112.8	12 899.7
1969	126.7	4 187.0	126.9	4 198.6	13.6	1 909.5	13.7	1 929.7
1970	127.0	5 751.6	127.1	5 758.8	6.8	988.8	7.0	1 024.8
1971	124.2	5 981.4	125.3	6 068.7	16.8	2 205.8	16.9	2 219.5
1972	127.9	8 125.4	144.4	9 776.7	58.7	9 671.5	60.9	10 056.9
1973	128.9	11 106.7	161.7	15 501.0	127.8	31 996.8	134.6	33 564.0
1974	73.8	3 693.7	81.9	4 700.1	14.6	3 388.7	15.1	3 529.9
1975	10.8	227.6	13.0	349.2	29.9	4 231.7	30.3	4 333.1
1976	113.0	2 654.5	115.1	2 804.3	63.5	9 160.1	64.0	9 324.6
1977	125.2	3 235.5	131.8	3 881.8	143.0	25 267.5	143.3	25 422.9
1978	140.0	9 198.8	145.2	9 812.7	72.9	19 280.4	73.1	19 323.3
1979	139.1	21 358.8	143.0	22 035.0	39.4	15 003.6	39.4	15 045.5
1980	128.5	20 154.4	129.7	17 485.4	41.9	15 341.4	42.0	15 382.1
1981	136.2	13 023.8	136.4	13 045.7	45.9	12 501.9	46.2	12 652.3
1982	157.1	11 231.2	158.0	11 294.2	81.1	27 963.7	83.2	29 673.7
1983	108.5	8 825.5	108.6	8 829.6	14.5	4 830.8	14.5	4 831.8
1984	104.9	8 139.0	108.7	8 234.6	7.1	2 401.8	7.1	2 407.0
1985	36.6	3 504.5	36.6	3 525.0	64.4	29 185.0	64.4	29 185.0
1986	173.9	15 920.0	174.0	1 593.0	25.5	16 689.0	26.3	7 655.0

	700 pounds and over				Total			
	U.S.		All countries		U.S.		All countries	
	(000 head)	($000)	(000 head)	($000)	(000 head)	($000)	(000 head)	($000)
1966	94.5	18 192.4	94.8	18 256.0	482.5	51 035.2	483.1	51 121.6
1967	18.2	3 859.0	18.4	3 904.5	224.2	18 196.4	224.6	18 255.8
1968	58.9	14 006.3	59.3	14 102.3	308.8	30 777.0	309.6	30 911.6
1969	42.8	12 117.0	43.2	12 240.2	183.0	18 213.6	183.9	18 368.5
1970	24.0	7 547.3	24.5	7 700.3	157.7	14 287.7	158.6	14 483.9
1971	14.7	4 444.0	15.2	4 580.5	155.7	12 631.2	157.3	12 868.7
1972	18.8	6 639.6	19.7	6 843.2	205.4	24 436.5	224.9	26 676.8
1973	49.0	20 453.4	51.1	21 075.0	305.7	63 557.0	347.5	70 140.1
1974	14.3	6 953.6	14.6	7 094.5	102.7	14 036.0	111.5	15 324.5
1975	152.9	31 585.2	153.2	31 737.8	193.6	36 044.5	196.6	36 420.1
1976	249.3	60 576.3	250.2	61 260.2	425.8	72 391.0	429.3	73 389.1
1977	242.7	69 330.3	243.4	69 751.2	510.9	97 833.4	518.5	99 055.9
1978	205.8	89 864.0	206.5	90 410.3	418.7	118 343.2	424.8	119 546.3
1979	141.3	100 343.8	141.7	100 710.4	319.8	136 706.2	324.1	137 790.9
1980	152.2	105 605.1	153.0	105 958.3	322.6	141 101.0	324.7	138 825.8
1981	130.9	84 832.0	132.9	86 803.3	313.0	110 357.6	315.5	112 501.4
1982	221.7	138 957.3	223.1	140 573.0	459.9	178 152.2	464.3	181 540.9
1983	212.1	141 537.7	212.4	141 785.7	335.2	155 194.1	335.5	155 447.1
1984	248.9	190 799.6	249.8	191 807.8	360.9	201 340.4	365.6	202 449.3
1985	233.0	165 275.0	234.8	167 516.0	334.0	197 964.5	335.8	200 226.0
1986	177.7	150 651.0	178.0	151 003.0	220.6	168 932.0	221.7	170 251.0

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

was further encouraged by Canada's last major herd liquidation, which began in 1976. Another factor encouraging exports was the increased supply of pork after 1976. Eastern Canada went from a red meat deficit to a self-sufficiency or surplus and, as pork supplies increased, prices fell. Beef prices remained relatively high and so domestic demand declined, so more cattle were available for export.

The surge in cattle exports was interrupted in 1979 by a truckers' strike in eastern Canada and by a gas shortage in the U.S., which increased transportation costs to the U.S. As well, there was a temporary halt in the liquidation that began in 1976, and a short build-up of the Canadian cow herd in 1980 reduced supplies. There was another drop in exports beginning in 1986 as Canada's herd liquidation halted. At this time, the composition of trade in live animals changed from the export of primarily cows to the export of slaughter steers and heifers, reflecting the relatively fewer numbers of cows available for slaughter.

Imports of live fed cattle come mainly from the U.S. for immediate slaughter and production of high-quality cuts (Table 4). Other live imports consist of purebred cattle for breeding. Imports of live cattle have remained fairly steady since the early 1970s, with the exception of those in 1981 when the spread between the U.S. and Canadian price widened because of relatively large supplies of overfat cattle in the U.S. The lower relative U.S. price provided incentive for Canadian packers to import cattle for slaughter. Imports of live cattle depend not only on domestic demand for beef at the retail counter but also on demand by Canadian packers, which is affected by plant capacity, costs such as wage rates and the exchange rate, since retailers have the option of importing beef rather than buying from domestic packers.

Trade in live purebred cattle is relatively steady, with the exception of a surge in imports and exports in the mid-1970s as cattle were brought from Europe (Table 5). These "exotic" breeds were used to improve Canada's cow herd by providing larger animals with a better feeding efficiency and leaner muscling. Top import breeds are Charolais, Hereford and Simmental. Canada's export trade showed a similar surge in exports as Canadian breeds and European breeds were exported to the U.S. Canada's main export

TABLE 4 CANADIAN IMPORTS OF LIVE CATTLE FROM THE U.S. PRIMARILY FOR SLAUGHTER, 1966-86

	Volume	Value
	(head)	($000)
1966	6 115	1 688.8
1967	27 551	7 739.6
1968	2 005	544.7
1969	2 151	457.6
1970	46 596	12 904.4
1971	84 326	22 031.6
1972	66 498	23 797.7
1973	214 603	99 297.9
1974	126 501	56 981.1
1975	118 217	27 015.1
1976	195 542	63 020.8
1977[1]	48 541	10 740.0
1978	55 753	35 655.0
1979	19 398	18 469.0
1980	70 911	55 414.0
1981	171 074	130 476.0
1982	86 056	67 891.0
1983	89 770	70 235.0
1984	47 480	33 499.0
1985	57 822	49 742.0
1986	71 388	51 811.0

[1] Live animals since 1977 are from the Livestock and Meat Trade Report.

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 5 CANADIAN EXPORTS AND IMPORTS OF PUREBRED CATTLE FOR BEEF BREEDING PURPOSES, ALL COUNTRIES, 1966-86

	Exports		Imports	
	($000)	(head)	($000)	(head)
1966	1 622.6	3 463	1 616.4	2 899
1967	1 893.6	3 239	2 320.8	2 656
1968	3 064.5	5 007	2 804.4	3 231
1969	4 858.5	5 236	4 095.6	4 830
1970	6 240.5	7 607	3 780.8	4 614
1971	7 791.7	6 708	4 548.7	4 893
1972	8 559.9	8 434	5 103.3	5 169
1973	12 258.1	10 217	12 482.5	10 933
1974	21 134.7	11 738	23 755.1	15 595
1975	11 281.5	5 910	11 824.8	5 162
1976	10 973.0	8 038	6 203.4	2 847
1977	9 060.6	6 313	1 526.0	1 181
1978[1]	10 850.0	8 615	588.0	1 150
1979	12 352.9	7 379	1 341.0	2 168
1980	10 388.4	6 231	2 228.0	2 483
1981	21 643.8	13 735	2 207.0	2 462
1982	13 977.3	10 832	1 263.0	2 170
1983	18 245.3	10 369	1 363.0	2 667
1984	16 403.6	8 025	1 159.0	1 716
1985	12 337.0	6 286	659.0	1 322
1986	6 836.0	3 725	556.0	1 951

[1] Number of head imported since 1978 is reported from data collected by Health of Animals, Beef for Breeding Category.

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

breeds since 1981 have been Aberdeen-Angus, Charolais and Hereford.

TRADE IN BEEF AND VEAL

Trade in fresh and frozen beef and veal is the only major component of the total cattle and beef trade in which Canada has a trade deficit (Figure 4). Canada imports manufacturing-quality beef mainly from Australia and New Zealand, and high-quality "table beef" from the U.S. Recently, the EEC and Nicaragua have entered the Canadian market (Table 6). Until recently, Australia, New Zealand and the U.S. had an equal market share in value terms. In 1983, this balance changed. The U.S. increased the value of exports to Canada significantly and now accounts for a larger market share than any other exporter in value terms. This may be related to packing-plant capacity and costs. The U.S. packing industry underwent a major restructuring around 1984 as plants rationalized and modernized. Costs were reduced through these measures as well as through wage rollbacks. It is possible that since that time there is a relative advantage in importation of beef rather than live animals for slaughter, thus accounting for the increase in beef imports.

FIGURE 4 TOTAL EXPORTS AND IMPORTS OF BEEF AND VEAL (FRESH OR FROZEN)

The EEC was able to make inroads into the Canadian market in 1981 and to increase market share, at the expense of Australia and New Zealand, because of large export restitution payments. This ended in 1986 as countervailing duties were imposed. On a value basis, the U.S. has more than 40% of our market for imported beef and veal, Australia has about 30% and New Zealand has about 20%.

Canadian exports of fresh and frozen beef and veal are primarily to the U.S. About 90% of our exports go to the U.S. and this accounts for about 40% of their imports. Canada's second most important customer is Japan and we supply about 10% of its import requirements. Other regions to which we export beef and veal are the EEC and the Caribbean (Table 6). Exports to the U.S. are mainly lower-quality beef for manufacturing purposes and for the fast-food industry. Trade in fresh and frozen beef and veal has steadily increased in the last 20 years and almost all the gains have been in the U.S. market.

TRADE IN PROCESSED BEEF AND MISCELLANEOUS PRODUCTS

Canada was a net importer of cured beef from 1966 to 1973, but since that time we have become small net exporters, most of which is smoked meat (Table 7). Imports come mainly from the U.S. while exports go to the Caribbean region. Canned beef is strictly an imported product and is divided between canned beef and canned corn beef (Table 8). Most of this product comes from South American countries that must process their product before exporting because of disease problems. Exporters of canned beef to Canada are Italy, Australia and Brazil. Canned corn beef comes from Argentina, Brazil and Australia.

An important point not often acknowledged is that exports of by-products such as hides, tallow and offals make up as much of our export earnings, as do either live animals or beef and veal. Canada exports both raw cattle hides and raw calf and kip skins to many European countries (Tables 9 and 10). Our major customers are Italy, Portugal, Japan, South Korea, Taiwan and the U.S. We import a small amount of these products mostly from the U.S., but most leather imports are higher-value glove and garment leather.

Tallow is exported to various countries for use in soaps and perfumes primarily, with some going to feed manufacturers (Table 11). Our major customers are The Netherlands, Japan and South Korea.

We are large net exporters of beef offals to the U.K. and the U.S. (Table 12). Canada also exports a wide variety of miscellaneous products in small amounts, including animal material for manufacturing drugs. We also export and import

canned meat preparations, meat extract and gelatin (Table 12).

CONCLUSION

There are two major conclusions to be drawn from this paper. The most important is that clearly the U.S. is our most important trading partner and that it will remain so for several reasons. Canada is the only major beef producer with a locational advantage to the U.S. We have the added advantage of good health status, which makes competition for this market, from South America in particular, unlikely in the immediate future. The U.S. is one of the few countries with per-capita incomes high enough to purchase the quality of beef we produce, since grain-fed beef is more expensive. Consumers in the U.S. prefer grain-fed beef, unlike consumers in other countries who find it too fat. Advances made in the production of lean beef have given Canada an advantage in providing a product that meets the needs of today's consumer in North America. This is good news to the extent that the U.S. is the world's largest importer and is one of the largest consumers of beef. It is bad news in that Canada has gained no significant new markets for beef and veal, and this makes Canada very dependent on the U.S. market and vulnerable to protectionist measures.

The second conclusion is that, even though Canada is an efficient producer of lean grain-fed beef, most of our export earnings come from primary products that do not contribute to value-added in this country. While the trade balance has increased in favor of Canada, the composition of trade has changed little in 20 years. Most of the increase in trade has been due to exchange rate changes, a gradually liberalized trading environment and increased supply from increasingly efficient production. We have made few gains in the processing area and appear to be losing ground in the balance of trade in processed product.

As Canada moves into a new and more liberal trading environment from the FTA and the GATT negotiations, it will be important to look hard at the present situation regarding our beef trade. We have a good product, we are efficient producers of cattle and beef and we are located next to the world's largest importer. In the future, it may be appropriate to use a different marketing strategy and to concentrate on improving the balance between the components traded.

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[1] Janice Dyer is an economist with the Market Outlook and Analysis Division of the Policy Branch, Agriculture Canada, in Ottawa.

[2] This table and all those hereafter are updated from a paper by Boswell (1973).

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TABLE 6A IMPORTS TO CANADA OF DRESSED BEEF AND VEAL (FRESH OR FROZEN), 1966-86

	Australia		New Zealand		U.S.A.		EEC		Nicaragua		All countries	
	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)
1966	4.2	2 175.7	2.9	1 276.6	4.4	4 511.9	0.0	9.8	0.0	0.0	11.5	7 974.0
1967	8.5	4 901.3	4.6	2 330.2	7.2	6 826.8	0.3	152.9	0.0	0.0	20.7	14 223.4
1968	10.9	6 254.7	6.4	3 184.8	3.6	4 917.6	0.1	51.5	0.0	0.0	22.0	14 408.5
1969	29.4	13 306.1	74.8	29 774.2	4.4	5 786.6	0.0	0.0	0.0	0.0	108.6	59 866.9
1970	55.2	25 786.0	73.4	31 066.1	5.8	7 038.3	0.0	0.2	0.0	0.0	134.4	63 890.7
1971	24.8	13 498.8	61.2	28 246.6	17.5	16 222.2	0.0	0.3	0.0	0.0	103.5	57 967.9
1972	58.4	35 515.7	47.8	27 003.9	27.1	26 386.1	0.0	0.0	0.0	0.0	133.3	88 905.8
1973	66.4	55 905.7	48.3	38 265.6	34.8	39 400.8	0.0	1.2	0.0	0.0	149.4	133 573.5
1974	45.9	36 986.0	54.7	39 926.7	17.6	21 580.1	0.0	0.0	0.0	0.0	118.2	97 492.8
1975	63.6	32 351.9	53.9	23 315.2	11.1	16 630.1	0.0	4.0	0.0	0.0	128.6	72 301.3
1976	106.9	56 842.9	78.6	44 760.4	24.2	32 108.9	0.1	34.9	0.0	0.0	209.7	133 747.0
1977	52.9	35 436.0	57.0	32 278.9	13.7	20 481.0	0.0	2.9	0.0	0.0	123.7	88 198.8
1978	60.6	56 908.4	66.3	58 537.7	17.9	32 097.2	0.0	0.0	0.0	0.0	144.8	147 543.3
1979	55.6	79 358.1	57.1	76 883.0	11.8	26 113.0	0.0	0.0	0.0	0.0	124.5	182 354.4
1980	50.1	68 441.3	53.9	74 613.0	12.8	34 240.1	0.0	0.0	0.0	0.0	116.8	177 294.6
1981	43.6	56 214.4	50.1	66 445.8	21.4	52 846.7	2.7	3 043.5	0.2	283.1	117.9	178 836.0
1982	47.0	57 820.5	49.8	61 118.1	20.1	47 776.1	7.7	8 487.6	0.4	698.2	125.2	175 900.5
1983	33.0	42 994.2	54.6	71 663.8	23.8	56 272.4	14.8	15 679.0	1.6	2 567.7	127.9	189 289.8
1984	29.6	42 656.9	37.3	51 997.5	44.8	109 236.8	50.2	55 226.4	9.7	18 030.6	171.6	277 193.1
1985	43.2	52 028.5	51.1	66 984.2	43.5	107 974.0	24.8	24 805.0	4.3	4 306.4	166.9	256 213.0
1986	71.6	89 272.0	45.4	57 616.0	43.5	106 722.0	2.6	2 882.0	3.5	3 430.0	166.9	259 922.0

TABLE 6B EXPORTS FROM CANADA OF DRESSED BEEF AND VEAL (FRESH OR FROZEN), 1966-86

	Caribbean		Japan		U.S.A.		EEC		All countries	
	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)	(million pounds)	($000)
1966	0.7	728.0	0.0	0.0	56.4	24 276.5	0.1	839.7	59.2	26 350.0
1967	0.5	598.2	0.0	0.3	27.4	12 701.5	0.7	496.5	29.6	14 377.6
1968	0.7	744.8	0.0	0.3	47.5	21 869.7	0.4	298.5	50.0	23 735.2
1969	0.8	987.1	0.1	34.4	45.9	24 909.4	0.2	128.1	47.4	26 370.3
1970	0.9	1 125.5	0.0	69.7	83.5	46 795.1	0.9	32.8	85.2	48 465.2
1971	1.0	1 217.5	0.0	29.0	80.4	44 960.8	0.1	29.5	82.6	47 013.3
1972	0.9	1 070.0	0.1	37.9	58.7	37 474.8	0.1	40.8	60.6	39 502.6
1973	1.0	1 385.5	1.5	1 459.3	56.5	51 721.1	0.3	342.1	60.4	56 503.8
1974	0.7	763.8	0.3	255.4	36.2	26 700.4	0.1	43.1	38.1	28 830.5
1975	0.4	340.6	2.0	1 491.1	22.7	14 258.9	0.0	8.2	25.4	16 352.3
1976	0.5	329.2	3.3	2 551.9	83.1	54 194.5	0.1	58.0	87.4	57 528.5
1977	0.5	355.5	3.9	3 309.6	75.6	49 882.6	0.1	51.8	80.2	53 816.9
1978	0.3	336.0	4.4	5 138.6	62.4	58 454.5	0.2	216.2	67.7	64 600.8
1979	0.3	590.7	6.1	9 439.6	76.8	95 840.9	0.1	124.6	83.6	106 612.3
1980	0.5	948.6	7.3	11 293.6	92.0	109 855.1	0.2	232.8	100.4	123 240.8
1981	0.5	938.4	9.0	14 019.4	114.7	126 140.3	0.4	710.0	125.2	142 877.8
1982	0.6	827.8	6.0	12 720.0	122.9	139 016.0	3.0	3 285.9	133.7	157 863.6
1983	0.6	901.7	5.3	7 546.7	125.0	137 779.9	2.7	2 615.1	134.6	150 470.4
1984	1.0	1 270.0	5.3	8 351.6	164.9	177 850.6	2.6	2 138.9	171.4	190 623.8
1985	1.2	1 272.5	6.3	13 968.9	188.9	201 405.6	1.1	913.1	197.3	218 801.0
1986	5.0	676.0	6.1	14 901.0	170.1	180 303.0	1.5	1 351.0	179.1	198 705.0

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 7 CANADIAN EXPORTS AND IMPORTS OF CURED BEEF, 1966-86

	Exports			Imports			Trade balance all countries
	U.S.	All countries		U.S.	All countries		
	($000)	(million pounds)	($000)	($000)	(million pounds)	($000)	($000)
1966	33.7	3.0	912.1	5 182.9	12.5	5 182.9	–4 270.8
1967	4.9	2.4	608.3	5 907.4	15.3	5 907.4	–5 299.2
1968	0.4	3.8	966.5	5 558.2	12.9	5 558.2	–4 591.7
1969	2.5	3.4	1 005.7	4 841.8	9.8	4 841.8	–3 836.3
1970	8.2	5.0	1 388.4	4 434.1	9.6	4 434.1	–3 045.7
1971	2.1	4.4	1 136.9	5 736.7	12.2	5 737.8	–4 600.9
1972	60.3	7.1	2 275.1	6 414.6	11.3	6 414.6	–4 139.4
1973	30.8	5.7	2 770.2	5 656.1	7.8	5 656.1	–2 885.9
1974	88.3	3.7	1 729.7	1 558.4	2.3	1 558.4	171.3
1975	112.1	6.2	2 474.6	8.6	0.0	8.6	2 466.1
1976	184.4	7.9	3 289.0	343.7	0.5	368.3	2 920.7
1977	100.7	4.4	1 535.0	572.7	0.2	572.7	962.3
1978	30.4	6.9	3 795.8	578.6	0.2	578.6	3 217.2
1979	30.5	4.4	2 939.0	390.1	0.1	392.2	2 546.8
1980	204.4	6.5	4 054.4	728.5	0.1	728.5	3 325.9
1981	65.3	5.3	3 415.2	2 652.3	0.3	2 652.3	762.9
1982	114.5	4.5	3 233.7	3 369.4	0.4	3 369.4	–135.8
1983	381.1	4.3	2 996.8	2 976.9	0.3	2 976.9	19.8
1984	233.9	3.7	2 799.6	2 605.7	0.2	2 605.7	193.9
1985	210.0	3.6	2 960.0	2 123.0	0.2	2 123.0	837.0
1986	233.0	3.1	2 818.0	2 526.0	0.2	2 526.0	292.0

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 8 CANADIAN IMPORTS[1] OF CANNED BEEF AND VEAL, AND CANNED CORN BEEF, 1966-86

	Canned beef and veal		Canned corn beef		Total canned	
	(000 pounds)	($000)	(000 pounds)	($000)	(000 pounds)	($000)
1966	475.9	182.3	8 588.4	3 602.1	9 064.3	3 784.4
1967	1 109.3	451.1	11 259.2	4 794.1	12 368.5	5 245.3
1968	1 203.8	535.8	8 703.9	3 750.3	9 907.7	4 286.2
1969	1 819.7	855.1	13 477.2	5 866.1	15 296.9	6 721.2
1970	2 008.2	869.0	11 303.5	5 111.0	13 311.7	5 980.0
1971	1 595.1	893.6	8 078.2	4 775.6	9 673.3	5 669.1
1972	1 786.5	855.0	11 524.9	7 251.2	13 311.4	8 106.1
1973	1 742.2	1 133.2	8 292.4	6 007.8	10 034.6	7 141.0
1974	1 390.8	950.1	7 887.9	8 604.8	9 278.6	9 554.9
1975	1 074.9	916.7	9 188.7	7 437.8	10 263.6	8 354.5
1976	1 803.5	1 353.3	12 391.0	10 137.8	14 194.5	11 491.1
1977	1 487.9	1 120.5	12 473.2	10 808.7	13 961.0	11 929.3
1978	2 063.1	1 736.6	12 159.6	10 758.5	14 222.8	12 495.0
1979	1 708.1	1 711.3	9 676.3	11 597.9	11 384.5	13 309.3
1980	294.4	541.2	8 542.4	13 740.3	8 836.8	14 281.5
1981	463.6	788.4	7 945.3	13 302.0	8 408.9	14 090.4
1982	439.5	795.4	11 338.8	16 097.6	11 778.3	16 893.0
1983	1 061.6	1 694.3	12 227.8	15 498.7	13 289.4	17 193.0
1984	483.8	961.1	10 547.1	12 517.5	11 030.9	13 478.6
1985	692.9	1 167.0	12 246.7	14 459.0	12 939.6	15 626.0
1986	428.9	1 034.0	8 126.7	9 988.0	8 555.6	11 022.0

[1] No exports of canned beef or veal from Canada were reported.

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 9 CANADIAN EXPORTS AND IMPORTS OF RAW CATTLE HIDES, 1966-86

	Exports			Imports			Trade balance all countries
	U.S.	All countries		U.S.	All countries		
	($000)	(000 hides)	($000)	($000)	(000 hides)	($000)	($000)
1966	1 470.0	2 509.1	27 390.1	10 303.8	984.4	10 309.8	17 080.3
1967	1 482.0	2 314.5	19 012.1	7 419.4	943.4	7 421.9	11 590.5
1968	3 106.6	2 344.1	16 133.3	8 506.5	1 194.6	8 549.4	7 583.9
1969	2 972.9	2 063.3	18 626.6	10 260.0	1 167.8	10 331.2	8 295.4
1970	2 918.7	1 910.1	16 113.4	8 425.3	1 089.9	8 460.2	7 653.1
1971	1 861.3	1 872.1	14 112.8	9 116.4	1 125.4	9 119.6	4 993.2
1972	5 315.8	2 424.1	35 788.4	15 527.8	1 092.5	15 533.1	20 255.3
1973	12 682.5	2 275.4	49 083.9	17 707.0	955.0	17 717.6	31 366.3
1974	7 380.8	2 268.2	36 916.5	14 907.7	1 100.4	14 907.7	22 008.8
1975	12 186.3	3 278.9	40 447.1	12 872.2	1 238.6	12 872.2	27 574.9
1976	16 295.4	3 372.1	61 922.4	21 315.5	1 431.0	21 516.1	40 406.3
1977	17 577.7	3 583.5	79 457.3	19 865.0	1 056.6	19 881.0	59 576.2
1978	20 744.5	3 237.0	95 149.5	33 595.9	1 151.8	33 595.9	61 553.6
1979	31 510.6	2 649.7	136 705.6	57 680.3	1 140.3	57 839.8	78 865.8
1980	28 034.7	2 897.6	104 320.0	42 473.6	1 257.7	42 477.8	61 842.2
1981	29 145.6	2 724.1	91 326.8	40 131.8	1 353.0	40 260.6	51 066.3
1982	17 590.1	3 516.4	120 902.4	33 422.8	1 010.2	33 422.8	87 479.7
1983	21 105.0	3 270.2	120 434.6	48 917.7	1 295.9	49 009.5	71 425.1
1984	28 545.5	3 738.2	173 611.2	51 905.9	1 120.0	53 400.2	120 211.0
1985	32 624.9	3 438.2	151 870.0	37 212.0	908.0	37 611.0	114 259.0
1986	21 516.0	3 518.5	193 232.0	38 948.0	817.4	39 339.0	153 893.0

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 10 CANADIAN EXPORTS AND IMPORTS OF RAW CALF AND KIP SKINS, 1966-86

	Exports			Imports			Trade balance all countries
	U.S.	All countries		U.S.	All countries		
	($000)	(000 skins)	($000)	($000)	(000 skins)	($000)	($000)
1966	1 216.2	714.7	4 381.5	2 993.5	489.8	3 622.2	759.3
1967	1 657.6	820.7	4 085.6	1 750.7	490.3	2 594.5	1 491.1
1968	2 004.2	823.5	4 267.0	2 335.4	471.8	2 928.2	1 338.8
1969	2 397.9	729.0	4 541.0	2 326.5	427.5	2 834.6	1 706.5
1970	908.8	567.4	2 244.4	631.4	234.9	1 225.3	1 019.2
1971	538.4	799.9	2 484.6	897.1	409.6	1 166.2	1 318.5
1972	1 138.2	627.0	3 105.2	1 322.9	292.6	1 819.2	1 286.0
1973	1 559.3	490.5	3 250.9	1 013.5	195.3	1 690.1	1 560.7
1974	1 788.8	469.8	3 053.7	403.3	101.6	800.8	2 252.9
1975	660.3	672.2	3 238.5	929.0	233.4	1 293.5	1 945.1
1976	579.0	740.1	5 254.4	1 422.2	242.5	2 174.7	3 079.7
1977	1 009.8	739.2	6 806.6	2 414.3	296.6	2 869.1	3 937.4
1978	1 648.2	798.9	9 674.8	2 653.5	272.4	2 977.7	6 697.1
1979	3 593.8	482.3	9 233.0	2 877.0	173.0	3 126.3	6 106.7
1980	1 946.0	466.8	6 386.4	3 650.6	304.9	3 792.2	2 594.2
1981	2 207.6	436.0	6 262.3	1 948.6	160.9	2 066.3	4 195.9
1982	1 968.1	456.3	5 995.7	2 619.2	270.8	2 852.1	3 143.5
1983	2 176.5	479.3	6 375.9	3 503.2	381.3	4 133.0	2 242.9
1984	2 534.4	460.5	7 409.6	2 905.2	318.2	3 244.9	4 164.7
1985	2 593.0	324.1	5 801.0	2 818.0	220.6	3 040.0	2 761.0
1986	2 573.0	798.0	15 123.0	4 940.0	368.9	4 940.0	10 183.0

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 11 CANADIAN EXPORTS AND IMPORTS OF TALLOW, 1966-86

	Exports			Imports			Trade balance all countries
	U.S.	All countries		U.S.	All countries		
	($000)	(million pounds)	($000)	($000)	(million pounds)	($000)	($000)
1966	79.1	126.8	11 066.3	821.8	7.1	821.8	10 244.4
1967	148.9	145.8	9 588.5	632.0	7.1	632.0	8 956.5
1968	372.9	165.9	9 178.4	1 681.0	17.3	1 681.0	7 497.4
1969	745.4	150.9	9 923.4	1 123.0	19.6	1 123.0	8 800.4
1970	1 056.5	179.3	15 306.7	2 073.0	21.8	2 073.0	13 233.7
1971	1 657.6	221.6	18 893.4	1 880.0	21.0	1 881.0	17 013.4
1972	1 306.2	238.2	16 519.7	1 491.0	18.5	1 491.0	15 028.7
1973	3 750.9	185.7	24 106.6	1 009.0	6.1	1 009.0	23 097.6
1974	3 386.3	218.8	40 535.9	1 480.3	7.7	1 480.3	39 055.6
1975	2 587.3	225.5	32 596.1	519.7	3.7	528.2	32 068.0
1976	2 745.4	245.7	37 492.8	295.1	1.8	301.1	37 191.7
1977	1 386.2	310.5	54 856.3	239.5	1.3	239.6	54 616.7
1978	16 343.8	305.5	65 702.1	218.6	0.9	218.6	65 483.5
1979	4 303.5	329.1	94 648.0	1 003.8	3.2	1 003.8	93 644.2
1980	4 151.6	366.8	87 652.3	1 460.8	4.8	1 460.8	86 191.5
1981	2 037.6	377.7	88 680.6	1 322.8	4.3	1 322.8	87 357.8
1982	1 874.6	352.5	79 234.1	1 235.7	4.3	1 235.7	77 998.4
1983	2 966.8	340.9	71 323.2	2 108.2	9.1	2 108.2	69 215.0
1984	3 274.2	359.6	95 975.7	4 376.0	12.5	4 376.0	91 599.7
1985	3 261.7	343.0	90 603.0	2 687.4	10.0	2 687.4	87 915.6
1986	2 543.0	374.1	64 851.0	2 968.0	17.6	2 968.0	61 883.0

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

TABLE 12 CANADIAN MISCELLANEOUS MEAT AND BY-PRODUCT TRADE WITH ALL COUNTRIES, 1974-86 ($ million)

	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Fancy meat and edible offal													
Export	17.5	17.0	18.9	17.3	27.7	38.9	48.9	58.4	62.6	49.9	60.8	62.1	68.1
Import	3.4	2.0	2.2	3.7	6.2	8.9	4.9	6.5	7.6	9.9	8.6	10.8	12.1
Beef offal													
Export	5.3	5.0	7.3	8.0	9.7	15.5	20.6	22.8	22.0	16.7	18.2	19.8	20.0
Animal material for mfrg. drugs													
Export	9.7	12.6	14.3	11.7	7.5	6.3	5.1	4.5	10.9	10.6	18.0	21.0	24.3
Import	0.9	1.2	1.5	1.7	1.1	1.2	1.6	2.3	1.3	2.5	2.6	3.9	4.1
Sausage													
Export	6.0	6.4	7.0	7.2	8.7	10.6	9.6	10.6	11.7	12.0	11.9	11.7	11.4
Import	0.2	0.2	0.5	1.5	2.2	1.5	1.7	2.5	3.0	3.0	2.9	4.0	4.9
Meat preparation, canned													
Export	0.9	2.4	4.6	0.6	1.2	0.9	1.3	1.7	4.3	1.6	3.8	6.0	4.0
Import	2.6	2.4	5.3	3.0	3.5	3.3	2.1	5.0	5.2	2.8	2.2	2.5	2.3
Meat preparation, not canned													
Export	0.8	0.8	1.2	1.3	1.4	1.0	1.3	1.4	1.5	1.8	2.3	3.5	5.7
Import	3.6	4.4	5.9	5.1	7.6	5.4	4.3	4.2	4.2	5.1	5.8	7.4	10.5
Sausage and meat casings													
Export	9.0	11.7	11.1	13.8	15.5	18.5	21.8	20.5	17.3	13.2	11.4	9.8	11.8
Import	12.7	15.8	15.3	18.2	20.3	21.7	28.8	29.4	27.6	26.3	28.4	27.1	29.1
Meat waste and tankage													
Export	1.4	1.3	2.2	3.6	2.6	1.8	2.2	2.8	3.1	1.6	3.2	3.9	4.4
Import	1.5	0.7	0.5	0.6	1.6	1.8	1.6	1.5	0.9	0.9	1.5	1.5	1.9
Extract of meat[1]													
Export	0.5	0.2	0.1	0.1	0.2	0.3	0.5	0.6	0.5	0.7	1.8	1.2	1.0
Import	3.0	2.0	1.9	2.2	2.4	2.4	4.0	4.6	3.6	4.5	5.8	6.1	
Animal semen													
Export	13.6	6.8	5.0	4.4	5.0	7.4	9.5	9.5	10.8	12.6	14.6	14.8	16.1
Glove and garment leather[2]													
Export	3.6	3.2	5.3	10.6	15.0	18.3	20.4	26.0	20.7	21.2	28.3	27.4	29.9
Import	30.9	55.1	52.4	36.1	42.4	58.1	40.7	59.3	49.2	62.6	71.3	57.9	91.0
Gelatin													
Export	4.7	5.3	4.4	4.3	5.4	5.6	6.9	7.6	8.0	8.4	10.7	9.8	10.5
Import	4.8	4.5	5.5	4.1	5.2	5.1	4.1	5.2	5.8	8.8	10.9	10.7	13.0

[1] includes rennet
[2] includes sheep and lamb leather

Source: Statistics Canada, External Trade Division, cat. no. 65-004 and 65-007.

Canada's fresh horticultural produce market: Consumption, imports and promotion

Robert W. Anderson[1]

Canada imports more than $1 billion worth of fruit and vegetable products annually. A large percentage of these imports come in the form of fresh produce. While the United States is the major supplier for most commodities, there are many countries that target Canada as a major market for their exports of fruit and vegetables.

In order to provide background for the design of an export plan to enhance a country's position in the Canadian market, it is necessary to have an awareness of the Canadian horticulture sector, some understanding of the characteristics of Canadian consumers in terms of fresh produce purchases, an indication of which countries now dominate the market, and finally an indication of how the products are advertised in terms of frequency of advertising and specific methods. This same understanding is necessary for domestic producers if they expect to maintain their position in the Canadian market.

CANADA'S HORTICULTURE SECTOR

Canada's horticulture industry operates in a global market. Domestic production, sometimes under marginal conditions, competes with imports from the U.S., Europe, and the southern hemisphere, and generally faces the same competition in export markets (Table 1).

Horticulture is present in all regions of Canada. For climatic reasons, many horticultural products, for example, tropical fruits and fresh fruit and vegetables, are imported. Even for those crops grown in Canada, the production capability is often limited by marginal conditions of temperature and season length. This results in a competitive disadvantage with respect to the production of similar crops in other countries. Canada has a number of tariffs but they do not impede importations as significantly as tariffs in many other countries. Products are marketed to consumers through retail food stores, produce outlets, institutional sales, roadside stands, pick-your-own operations and farmer markets, hotels, and restaurants. Products are also exported via brokers and other intermediaries.

Canadian consumers are becoming increasingly aware of the need to expand their fruit and vegetable consumption to better balance their nutrient intake as well as to increase the variety in their diet. This consumer awareness, according to the grocery industry, has resulted in the displacement of the meat department by the produce department as the largest contributor to store profits per unit of store area.

CONSUMPTION

Canadian per-capita consumption of fruit has remained relatively constant over the 1978-85 period (Table 2), although there is some annual variation within specific commodities and some trends among commodities. For example, apple and grape per-capita consumption has tended to increase, while grapefruit and pear consumption has been declining slightly. Very little change is observed in orange and lemon consumption.

Per-capita consumption of vegetables in Canada has increased gradually over the 1978-85 period (Table 3). Most of the growth is evident in carrots and cucumbers. Other commodities have had a marginal increase. Consumption of a number of fresh vegetables in the raw state has increased in recent years as salads have become more important to the diet.

Consumer studies reveal that a number of changes in the structure of Canadian families is having an impact upon purchases. Increased incomes, travel to many other countries where "exotic" produce is regularly served and increased use of exotic produce by the foodservice industry have all led to increased at-home demand for different produce. Male adults are doing more shopping and do more impulse buying than do female adults. This will have an impact on point-of-sale advertising. There are many more two-income families and retirees with two pensions. In the former situation, the impact is less time for shopping and more money for purchases, including fresh out-of-season fruit and vegetables. Some of the impact of this change is already evident in the increase in the melon and

TABLE 1 HORTICULTURE GROUP COMPARISONS, 1985

	Farm gate value	Distri-bution	Number of pro-ducers	Volume of pro-duction	Imports[1]	Exports	Balance of trade	Production area
	($ million)	(%)		(000 t)	($000)	($000)	($000)	(ha)
Potatoes[2]	236.9	13.9	7 139[3]	3 029	91 366	96 080	4 714	122 170
Fresh field vegetables[4]	233.3	13.7	13 208[3,5]	915	497 230	54 104	(443 126)	50 788
Processing vegetables	141.3	8.3	N/A	942	181 940	111 133	(70 807)	60 269
Mushrooms	132.7	7.8	129[3]	49	45 839	NIL	(45 839)	63
Protected vegetables	43.0	2.5	585	36	N/A	N/A	N/A	128
Berry crops and grapes[6]	154.7	9.1	5 881[3]	159	217 083	42 574	(174 509)	31 459[3]
Apples	115.6	6.8	8 114[3]	479	99 574	32 215	(67 359)	34 112[3]
Other tree fruit	52.9	3.1	N/A	92	203 573	7 164	(196 409)	12 414[3]
Flowers	314.2	18.4	1 611	N/A	62 162	40 124[7]	(22 038)	297
Nursery	177.8	10.4	613	N/A	56 340	9 262[7]	(47 078)	28 878
Honey	56.9	3.3	19 635[3]	36	643	22 922	22 279	N/A
Maple products	45.9	2.7	12 071[3]	14	NIL	31 709	31 709	N/A
TOTAL	1705.2	100.0	–	5 751	1 455 750	477 287	(1 008 463)	335 735

[1] excludes commodities not grown in Canada, which in 1985 had an import value of $701 million
[2] includes fresh and processed potatoes
[3] 1981 Census statistics
[4] does not include processing vegetables
[5] includes all vegetables (fresh and processed)
[6] does not include wines
[7] estimates

Source: Statistics Canada: 1981 Census publication; Imports Merchandise Trade, cat. no. 65-203 Annual; Exports Merchandise Trade, cat. no. 65-202 Annual; Fruit and Vegetable Production, cat. no. 22-003 Annual; Greenhouse Industry, cat. no. 22-202 Annual; Honey Industry, cat. no. 23-210; Maple Industry, cat. no. 22-204.

TABLE 2 FRESH FRUIT CONSUMPTION, SELECTED ITEMS, 1978-85 (kg per capita)

Year	Fresh fruit[1]	Apples	Oranges[2]	Grapefruit	Grapes	Lemons	Pears
1978	59.90	10.74	10.77	3.88	5.15	0.85	2.54
1979	60.56	11.81	10.17	3.33	6.48	0.85	2.44
1980	60.95	10.78	11.88	3.57	5.93	0.82	2.25
1981	64.08	12.99	12.02	3.22	5.46	0.85	2.52
1982	59.98	12.29	10.82	3.25	6.29	0.84	0.50
1983	61.77	10.81	11.48	3.29	6.74	0.85	2.44
1984	62.87	12.29	10.52	2.78	6.87	0.85	2.64
1985	60.17	12.63	9.90	2.69	6.68	0.88	1.97

[1] all fresh fruit including citrus and tomatoes
[2] includes oranges, mandarins and tangerines

Source: Statistics Canada.

TABLE 3 FRESH VEGETABLE CONSUMPTION, SELECTED ITEMS, 1978-85 (kg per capita)

Year	Fresh vegetables[1]	Carrots	Onions	Cabbage	Lettuce	Cucumbers
1978	46.64	8.25	6.93	6.43	9.27	2.07
1979	50.12	9.94	6.51	5.80	9.51	2.20
1980	51.27	9.31	6.58	5.83	9.40	2.16
1981	53.38	9.26	6.97	6.24	9.53	2.27
1982	53.02	10.22	6.88	6.15	8.86	2.42
1983	53.17	10.29	6.78	6.37	9.25	2.52
1984	54.21	9.77	6.63	6.65	9.58	2.60
1985	47.78[2]	10.10	7.35	NA	9.62	3.39

[1] total vegetables excludes tomatoes and potatoes and includes mushrooms
[2] partial

Source: Statistics Canada.

TABLE 4 APPLE IMPORTS, MAJOR SOURCES, 1978-86 (t)

	United States	France	South Africa	New Zealand	Argentina	Chile	Total[1]
1978	58 711	4 058	5 636	3 877	11	2 154	74 509
1979	67 831	6 752	12 228	4 169	–	5 083	96 110
1980	55 476	4 171	11 087	4 588	–	3 272	78 595
1981	94 384	2 921	4 006	3 706	–	3 701	108 719
1982	87 118	9 492	3 693	3 016	17	4 320	107 678
1983	54 287	5 997	6 688	12 598	1 268	3 760	85 502
1984	64 849	7 702	10 477	8 437	16	6 368	98 844
1985	57 205	6 442	14 349	15 107	203	5 978	99 492
1986	63 489	8 605	6 413	20 532	705	6 899	107 188

[1] includes other countries

Source: Statistics Canada, Trade of Canada.

TABLE 5 GRAPEFRUIT IMPORTS, MAJOR SOURCES, 1978-86 (t)

	United States	South Africa	Argentina	Chile	Mexico	Total[1]
1978	92 138	784	–	–	1 206	94 236
1979	79 396	1 157	–	–	965	81 686
1980	86 550	1 107	–	–	931	88 682
1981	78 709	1 219	–	–	325	80 987
1982	80 965	534	–	–	742	82 723
1983	86 191	298	5	–	387	87 147
1984	70 745	894	–	–	184	72 122
1985	68 983	574	325	13	111	70 288
1986	76 355	1 227	425	–	104	78 278

[1] includes other countries

Source: Statistics Canada.

tropical fruit segment of the industry, where sales have increased significantly. With two incomes, these families are willing to pay higher prices for products and to purchase more service. Canadian consumers are becoming better educated and thus more informed about nutrient value as related to price and health concerns. As a result, these consumers will be more difficult to persuade through advertising. For example, nutritional claims must be fully supported, as more consumers will demand hard evidence. Lower-quality produce will not be acceptable, even at lower prices; consumers want and are willing to pay for quality. Health concerns, including the presence of pesticide residues, are of major concern to many informed consumers. Any suggestion of contamination in a product will result in both a quick rejection and a reluctance to return to the product.

Consumption in terms of specific products is dependent upon habits and historical patterns. An examination of the purchases by Canadians of different national origins indicates significant differences in fruit and vegetable preference. Asians, for example, are not particularly fond of apples but do consume a large volume of vegetables. With a significant increase in the number of Asian immigrants, Canada's overall consumption pattern is changing. Fresh fruit and vegetable presentation is also a factor for many segments of the population. Some population groups prefer bulk purchasing, while others prefer prepackaged goods. Attention must be directed to meeting these patterns and traditional habits. Producers and importers will have to target their promotion and products for many Canadian markets according to ethnic origins.

Income and age are also factors in determining most of the consumption patterns of many consumers. Consumer income level is not a major factor for apple sales while, for exotic fruit and vegetable items, it is a factor. As disposable incomes increase, consumers appear to be more willing to try out-of-season produce not usually consumed and better-quality product. Age has also been determined as a factor in apple consumption. Younger Canadians do not appear as inclined to eat raw apples as are their parents. This will require a change in promotion programs if this trend is to be reversed or the long-term apple consumption rate will decline. If the young people do not change their habits, the effect of this group's aging will be a major factor for future apple sales.

Canadian produce consumption in the distant future is expected to peak as a result of an aging and possibly a declining population. As the population ages, per-capita consumption in terms of volume is likely to decline. There may also be a negative impact on those items high in roughage if senior citizens have digestive systems that cannot cope with large volumes of fiber. At the current rate of immigration and births, Canada's population will peak at approximately 28 million and then decline. Once the population decline is combined with the aging factor, the size of the Canadian produce market will decline. This will lead to intense competition by those countries selling to Canada.

CANADIAN IMPORTS

A review of Canada's imports of six commodities over the 1978-85 period demonstrates that a range of countries export to Canada. In the last few years, the volume coming on the Canadian market has been increasing.

Product price or value is often the determining factor in import sales. Data are available only in terms of the total value, which, when reported in per unit terms, gives a very general idea of the situation. Per-unit values are determined by quality levels and distance. One example is close competition arising among several countries to become the second most important source of lemons for Canada; over the 1982-86 period, a number of countries became major lemon shippers to Canada (Table 9). In the situation for pears, the per-unit value declined and the volume declined, possibly because of a quality problem. Orange sales to Canada for some countries increased in 1986 when the per-unit value declined. Clearly there is a major correlation between product prices and the volume of sales.

Quality is also a major factor in import sales. Competition from the United States and other countries in the same store is based on uniform sizing and fewer blemishes. Canadian purchases are based on eye appeal. Even if the price of the blemished product is well below that of unblemished product, many Canadian consumers will not buy the blemished product. Consequently, exporters from all countries must concentrate on delivering uniform quality to the Canadian market.

TABLE 6 PEAR IMPORTS, MAJOR SOURCES, 1978-86 (t)

	United States	France	Portugal	South Africa	Australia	New Zealand	Argentina	Chile	Total[1]
1978	19 051	336	–	678	333	497	–	529	19 051
1979	24 787	369	–	589	457	213	–	364	24 787
1980	20 553	208	–	1 941	393	376	–	801	20 553
1981	26 932	413	–	2 104	854	455	–	858	31 768
1982	21 625	1 073	16	1 099	846	28	–	1 531	26 431
1983	19 288	903	195	1 331	1 194	644	–	1 250	25 698
1984	27 558	2 519	680	1 434	882	663	–	1 945	36 585
1985	22 229	1 424	575	2 653	1 312	1 681	1 128	1 821	33 417
1986	23 468	1 062	1 881	3 004	1 376	742	455	2 875	34 998

[1] includes other countries

Source: Statistics Canada, Trade of Canada.

TABLE 7 GRAPE IMPORTS, MAJOR SOURCES, 1978-86 (t)

	United States	Italy	Spain	South Africa	Argentina	Brazil	Chile	Mexico	Total[1]
1978	105 559	250	121	189	–	–	7 467	654	115 944
1979	132 682	13	–	461	–	–	9 214	1 452	144 578
1980	124 747	125	85	742	–	–	8 753	683	136 263
1981	111 541	979	649	491	–	93	10 523	466	124 919
1982	126 745	1 225	1 882	404	–	230	13 586	907	145 233
1983	132 036	2 676	2 196	748	6	202	16 035	1 096	155 266
1984	129 408	2 262	4 727	856	24	154	19 757	457	157 928
1985	127 826	2 077	4 874	1 210	48	526	20 521	449	157 799
1986	126 850	2 277	5 883	1 003	34	423	20 798	1 234	158 857

[1] includes other countries

Source: Statistics Canada, Trade of Canada.

TABLE 8 ORANGES, MANDARINES, TANGERINE IMPORTS, MAJOR SOURCES, 1978-86 (t)

	United States	Italy	Spain	Israel	South Africa	Morocco	Japan	Aus-tralia	Brazil	Uru-guay	Mexico	Argen-tina	Total[1]
1978	226 985	53	48	2 894	11 823	1 170	12 017	1 999	85	152	2 244	–	261 332
1979	213 498	59	184	52	9 072	5 964	13 209	2 219	–	–	1 619	–	249 190
1980	258 568	27	–	378	9 299	6 401	13 857	2 324	–	111	2 065	–	295 579
1981	259 208	140	3 485	–	8 248	9 535	13 988	2 000	76	–	2 079	–	301 962
1982	216 836	52	4 784	3	15 222	9 692	15 835	1 602	4 429	1 423	1 428	–	275 078
1983	250 417	383	1 052	1 998	6 916	12 307	14 904	1 839	338	656	1 104	–	294 714
1984	198 354	538	9 415	6 116	12 340	19 226	17 578	2 254	134	3 147	353	2	272 776
1985	179 404	339	11 859	4 770	9 677	20 377	19 361	2 719	540	4 729	552	1 271	259 695
1986	217 039	1 747	11 367	4 504	6 445	17 827	12 580	1 727	561	2 392	591	2 495	286 739

[1] includes other countries

Source: Statistics Canada, Trade of Canada.

TABLE 9 LEMON IMPORTS, MAJOR SOURCES, 1978-86 (t)

	United States	Spain	South Africa	Argentina	Chile	Uruguay	Total[1]
1978	20 729	–	153	–	–	–	20 950
1979	20 009	60	785	–	16	–	21 135
1980	19 515	–	936	–	17	–	20 585
1981	21 253	–	248	–	18	–	21 253
1982	17 758	2 015	468	–	534	233	17 758
1983	20 570	–	176	18	549	639	20 570
1984	20 113	786	429	–	78	873	22 380
1985	17 898	318	598	1 943	21	2 289	23 323
1986	20 003	2 362	745	1 553	87	1 434	26 258

[1] includes other countries

Source: Statistics Canada, Trade of Canada.

TABLE 10 PRODUCT VALUE COMPARISON OF SELECTED FRUIT IMPORTS ($/kg)

	All imports	United States	Argentina	Chile	South Africa
Oranges					
1985	0.59	0.61	0.78	0.93	0.32
1986	0.61	0.56	0.69	0.81	0.31
Grapes					
1984	1.04	0.93	0.67	1.78	1.63
1985	1.06	0.89	0.86	2.09	1.90
1986	1.15	0.99	1.10	2.00	2.37
Grapefruit					
1985	0.46	0.46	0.76	1.75	0.30
1986	0.47	0.47	0.56	–	0.33
Apples					
1983	0.62	0.52	0.37	1.09	0.83
1984	0.66	0.58	2.39	0.97	0.68
1985	0.78	0.58	0.88	1.02	1.25
1986	0.82	0.64	0.64	1.15	1.34
Lemons					
1985	0.76	0.80	0.80	1.14	0.21
1986	0.63	0.66	0.45	0.78	0.16
Pears					
1985	0.90	0.82	1.26	1.12	1.27
1986	0.95	0.87	1.06	1.31	1.38

Source: Statistics Canada, Trade of Canada.

South Africa has been a major competitor in the Canadian market throughout the 1978-86 period. Under recent regulations, South Africa will not be permitted to sell to Canada. As a result, this will provide an opportunity for market growth for all of the other countries and for domestic producers. As per-unit values for most products from South Africa are quite competitive, it is likely that a specific segment of the Canadian market featured the products. Countries wishing to increase sales in this sector will have to direct their efforts to former customers of South African product.

PRODUCT PROMOTION

Canadian consumers are provided with a constant volume of product advertising. Television, radio, newspapers, magazines, separate flyers and in-store materials all carry the message. While all methods are used, the high cost for television makes it the least-used method. In-store materials and major food retail advertisements are the least costly and the most popular. Quite often a major retail food chain will include some agreement on promotion at the time a decision is made to purchase a large shipment of product. In terms of effectiveness, an advertisement with a retail food chain flyer usually has a price incentive in terms of a reduced product price for a limited period of time. This moves a large volume of product immediately, but has little or no impact upon future sales. In-store materials usually stay in place for the duration of the marketing season and have a longer-term impact on consumers. If the product is consistently displayed at the same location, the usefulness of the in-store material may diminish over time. Once regular store customers decide what product they will buy, it is difficult to bring about a change in choice. Advertisers should also be aware that material for in-store promotion must be designed to be consistent with the decor in the store. This means that the same material may not be appropriate for different firms and that the store's decor must be known before designing the material.

Many retail food outlets carry only one or two choices of imported fresh produce. Thus if consumers regularly buy oranges and if the store they shop at carries only two choices, the consumer will likely compare the two and, if quality and price are fairly consistent, will usually remain with the same choice as in the previous week. Consequently, the critical factor is the acceptance by a major retail food store in terms of selling the material profitably.

Product sales depend to a large extent on the buyers' requirements in each major company. If the buyers have no delivery or quality problems, if the product is presented in as modern a way as possible and if prices are competitive, then the buyers will stay with a particular source. For firms with very limited promotion funds, the entire budget should be spent on produce buyers and their problems to find out what kind of problems produce buyers have to determine whether the product or service can overcome them, and to contact buyers through trade shows and specific invitation sessions where the service and quality of the product is demonstrated.

Produce buyers are judged by the profitability of produce sales and by the image the stores have in terms of fresh product. If individual store produce managers are having problems and are complaining about a product, then an opportunity may exist for product from another source. Thus some ground work in terms of how the product arrives at the individual store level is very important.

Canadian consumers are more conscious of the freshness of a product than are their U.S. counterparts. Consumers in the two countries have different ideas of the size of freezer and produce space in refrigerators. Canadians who must import a large percentage of their fresh produce, and thus treat it with great care, would like more produce space and less freezer space. The opposite view prevails in the United States. Canadians also eat more produce on a per-capita basis and have on average more emphasis placed on produce counters in grocery stores. With all of the attention paid to the sector, consumers are very aware of quality.

A number of regional differences exist. In Quebec, for example, all material must be publicized in French. Some regions prefer pink grapefruit while others prefer white. Artificial coloring on oranges may not be acceptable in some areas. The size of the country contributes to significant differences. Of the two major cities in Canada, consumers in one prefer "pink" greenhouse tomatoes while those in the other prefer "red" tomatoes. For consumers in some areas, an easy-peeling navel orange may be the main item, while in others the flavor of the valencia orange may outweigh any difference in peeling.

Canada also has a substantial institutional market. This market includes juice operations selling directly to individuals, and part of the market includes hospitals, homes for senior citizens, schools, etc. Although this market is looking for quality, appearance may not be as important. If sizes are different and if there are blemishes that do not affect quality, then the product may be quite suitable. This is a market that should not be ignored.

Canada has a wide range of specialty stores that feature produce. These operations have 60% to 80% of their total volume from produce only. They try to establish a rapport with consumers such that "situation" reports are sometimes posted in the stores to explain significant quality and price changes. A recent example has been the poor-quality lettuce offered for sale at close to $3 per head in Ottawa stores. Countries wishing to establish a foothold in the Canadian market might look at this market segment.

National consumer promotion is fairly expensive in Canada and is likely beyond the budget of many firms. National promotion in three major magazines in both languages for a period of two months would cost approximately $85,000 for a half-page, and would reach about five million people.

SUMMARY

Many countries are interested in competing with Canada's domestic industry in supplying the more than $1 billion worth of produce imported into Canada. While the growth in this market may be limited by age and by a decline in population in the future, the market is attractive from a per-unit value basis. Canadian consumers demand and are willing to pay for top-quality produce. While Canada does not produce all of the products, there are a number available in Canada and producers will compete with other countries for this market.

Promotion in a country as large as Canada and with as many regional differences is very difficult. Firms wishing to expand in the Canadian market would be well advised to cater to specific sectors and to work closely with buyers.

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FIGURE 1 DECLINE IN HOUSEHOLD SIZE, 1961-91

FIGURE 2 RISE IN PROPORTION OF WORKING MARRIED WOMEN, 1961-81

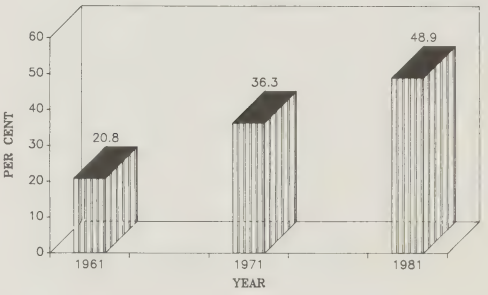


FIGURE 3 RISE IN EDUCATIONAL LEVEL OF CANADIANS, 1971-81

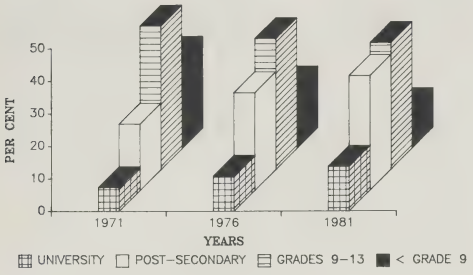


FIGURE 4 AREA OF ORIGIN OF IMMIGRANTS, 1983-85

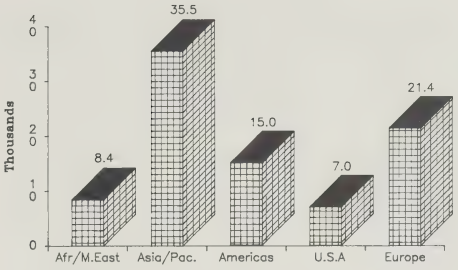
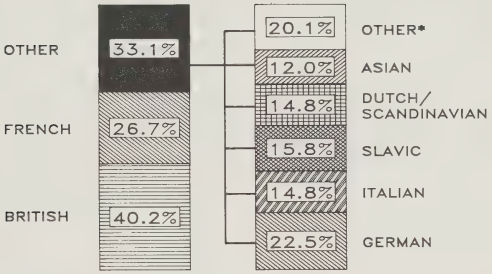


FIGURE 5 CANADIAN ETHNIC MIX, 1981



1 INCLUDES JEWISH, GREEK, PORTUGUESE AND NATIVE PEOPLES

Decoupling: The concept and its future in Canada

J. K. Martin[1]

INTRODUCTION TO PAPERS ON DECOUPLING

On February 11-12, 1988, in Ottawa, the Canadian Institute of Resources Law, with funding from Agriculture Canada, held a symposium on "Decoupling: The Concept and Its Future in Canada." About 150 farmers, agri-business entrepreneurs, government officials, academics and others attended, including some international representatives.

In financing the conference, Agriculture Canada intended that some of the many Canadians interested in agriculture policy would be able to discuss the concept of decoupling, to review the environment of international trade that has raised the profile of what, after all, is not a new idea, and to investigate the possible consequences for Canada. In my introductory remarks to the conference, I stressed that the goal, from Agriculture Canada's perspective, was to develop a shared understanding of the issues. It was emphasized that the Government of Canada had not decided to embrace decoupling and was not trying to persuade the sector to accept decoupling. Nevertheless, it was important for the topic to be publicly discussed and analyzed.

The symposium was fortunate to have started with a comprehensive and interesting paper by Professor Clay Gilson, who explored the earlier experience with efforts in this area. His concluding observations about the difficulty and highly political nature of moving toward decoupling are particularly relevant for those who would wish to advise governments on such matters.

Professor T.K. Warley had been charged with the unenviable task of trying to sum up the conference and to provide his views on what could be learned from two full days of discussion on some 14 papers and an international panel (with representation from the OECD, GATT and the United States). This he did brillantly, as usual, at the end of the symposium. Professor Warley's perspective on decoupling and the symposium provide a useful starting point for anyone who wants to explore the concepts of decoupling further.

The proceedings of the symposium should be available in a few months but, to reach a broader audience more quickly, the editors of the Canadian Farm Economics thought it desirable to publish in the journal the remarks of Professors Gilson and Warley. These papers are reproduced below and represent an excellent introduction to the concept and its possible future in Canada.

Those who wish more information on the symposium can write to Jim Martin, c/o Canadian Farm Economics.

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Early experiences with the coupling and decoupling of agricultural price supports and farm commodities

J. C. Gilson[1]

From the time of the U.S. Agricultural Adjustment Act in 1933, the Canadian Agricultural Prices Support Act in 1944, and the launching of the European Community Common Agricultural Policy in 1958, most farm price supports, as a matter of national policy, have been specifically related (coupled) to specific agricultural commodities or commodity groups.

The U.S. Agricultural Adjustment Act provided for a legal, formula-based, commodity-specific price support system, which was based primarily on the parity price concept. Under the U.S. system, there can be little question that price supports have been closely coupled with specific commodities. While the Canadian Agricultural Prices Support Act did not provide for a specific, formula-based, price support system, it did provide a set of conditions under which price supports would be related to a designated group of agricultural commodities. Under the EC Common Agricultural Policy, the price intervention support system and related programs have been directly associated with specific farm commodities. Similar commodity-specific forms of price supports and related import controls have been established in Japan and many other countries.

Throughout the past four decades, many studies have been made of the problems created when agricultural price supports have been closely tied to, or coupled with, specific farm commodities. A variety of proposals have been made to decouple price supports from specific commodities.

Recent debates relating to the commodity-specific forms of price support have arisen as a result of the trade distortions caused by this form of policy. Proposals have been made under the Uruguay Round of the GATT negotiations that all forms of commodity-based price supports should be eliminated and that the equivalent of that support should be paid to farmers in the form of direct income payments.

For the purposes of this paper, we will define "decoupling" in the following way: Decoupling will be achieved when any government payment, production or price subsidy, or any form of public financial support or benefit (including commodity-related regulatory measures or import controls) received by an agricultural producer have no direct connection with, or have no direct influence on, the allocation of resources (either in production or consumption) devoted to a particular commodity or production practice relating to a specific commodity. Decoupling does not necessarily preclude some form of direct payment to an agricultural producer, provided that the support payment does not directly influence how the producer will allocate his resources within or among the commodity alternatives open to him or how consumers allocate their food budget among food products. The definition, by implication, indicates that resources in farm production (and consumption) should be allocated in accordance with the competitive forces of demand and supply in the marketplace.

THE AMERICAN FARM ECONOMICS ASSOCIATION EXAMINES THE ISSUE

In the spring of 1945, the American Farm Economics Association sponsored financial awards for the best papers submitted on the topic "A Price Policy for Agriculture Consistent with Economic Progress That Will Promote Adequate and More Stable Income from Farming" (Nicholls and Johnson 1946). Some 18 papers were selected for the awards.

The 18 papers were unanimous in their agreement that the main function of agricultural prices should be the reflection of "consumer choices in the allocation of agricultural resources among individual farm products."

The prize-winning papers agreed that the then existing parity price formula was inadequate in terms of meeting the requirements of a properly functioning pricing system; that is, the parity price policy distorted the efficient allocation of resources in terms of farm production, food consumption and regional use, ignored the necessity for the shift of redundant resources out of agriculture to other sectors, created food surpluses that had to be held in government storage, did not address the low-income problem

in agriculture, and led to unnecessary regimentation of farmers through production and marketing quotas.

There was almost unanimous agreement among the authors of the 18 papers that "any minimum income commitments should be made good by direct price or income payments to producers rather than through market price supports"; in other words, price or income supports to farmers should be "decoupled" from specific commodities, and the competitive forces of the marketplace should be permitted to allocate resources within and among farms and regions in accordance with consumer choices and preferences.

It was to be only four years later that economists were to be presented with one of the most controversial proposals for "decoupling" ever to be advocated in U.S. agricultural policy history. This proposal was called the "Brannan Plan."

THE BRANNAN PLAN

The Brannan Plan, named after former U.S. Secretary of Agriculture Charles F. Brannan, was proposed to Congress in April 1949. The plan provided for the stabilization of farm income, not by price supports, but by direct federal payments to farmers. This plan created an enormous amount of economic and political controversy within Congress and among farm organizations.

The Brannan Plan essentially called for an "income support formula" (calculated on the basis of a high level of designated price supports) under which formula income support would be provided by direct cash payments to farmers whenever their incomes fell below some predetermined level. The plan also provided that large-scale commercial farmers would share the programs' benefits only on that part of their production an efficient "family farm" could produce. To qualify for the programs' benefits, farmers would have to abide by approved conservation practices and necessary production or marketing controls (Christenson 1959).

The Brannan Plan was denounced by many congressmen and several farm organizations, primarily the American Farm Bureau Federation, on several grounds:

- the relatively high income support under the plan would stimulate production and lead to surpluses (or production controls), in spite of the fact that the payments to farmers were not tied to an explicit form of commodity-based price supports;
- the plan would not in fact be neutral in terms of resource allocation; that is, while the direct payment program would in theory permit prices to clear the market, it would impair the capacity of the price system to allocate resources in an efficient manner;
- income payments under the Brannan Plan would be capitalized into higher land values – a windfall gain in the short run for people who own farmland – but would in the long run increase the capital costs of farm production;
- the income payments would be seen as subsidizing farm product exports, which represent distortion and interference in foreign trade;
- the income payment approach would make farmers dependent on congressional appropriations for their net income, and in effect it would put farmers on the government payroll without civil service status;
- the direct income payment program would be providing farm products to food consumers at less than their true value; and
- the program would inevitably lead to greater and greater public intervention in the agricultural industry.

After a prolonged and bruising national debate over the Brannan Plan within Congress and within farm organizations, the plan suffered a crushing defeat in Congress. However, proposals similar to those provided for under the Brannan Plan continued to resurface in later years. There is little question that the commodity-specific types of farm price support programs continued to generate enormous problems within the agricultural industry. Advocates of a direct income payment type of policy continued to press for a decoupling of farm price supports from specific commodities.

THE U.S. CONGRESS EXAMINES POLICY ALTERNATIVES

One of the more comprehensive examinations of alternative forms of price and income support for farmers was undertaken by the Joint Economic Committee of the U.S. Congress (1957). This examination covered a wide variety of topics: marketing orders and agreements, adjustment

assistance for rural people, the pros and cons of the competitive market price system, expansion of domestic and foreign demand, direct payments to producers, and production control measures.

Many of the submissions to the Joint Economic Committee underlined the difficulties and failures of the traditional commodity-specific forms of price support that had characterized U.S. farm policy since the establishment of the Agricultural Adjustment Act in 1933. These difficulties and failures indicated the following:

- the commodity-specific form of price support had led to the production of costly surpluses, which in turn led to serious problems of storage and surplus disposal or costly production control measures;
- surplus disposal programs have reduced the markets for current production in the domestic market and have created ill will among foreign producers of competitive products;
- the commodity-specific type of price support programs have created inefficient use of resources within and among farms and among regions of the country;
- the traditional programs have impeded necessary structural adjustments within the agricultural industry as a result of technological progress in farming;
- any benefits accruing from the farm programs have been capitalized into higher land values, thus creating longer-run capital costs within the agricultural industry;
- the increasing controls in the agricultural industry that had been developed to cope with the effects of the traditional commodity-specific price support programs meant greater regimentation of farmers; and
- the traditional price support programs had become increasingly costly from a public treasury point of view, while at the same time leaving many of the major farm problems unresolved.

In view of the difficulties associated with the traditional commodity-specific price support programs, several submissions to the Joint Economic Committee underlined the need to decouple price supports from specific commodities through some form of direct payment program.

The proposals for direct payments to producers involved two basic approaches.

One approach involved two sets of prices: a specified price support level for producers, which would be designed to compensate producers for the cost of the commodities they produced; and a market-clearing price that would be used to distribute those products among food consumers. A direct price payment, based on the difference between the specified support price and the market-clearing price for a given commodity, would be paid directly to the producer in the form of a deficiency price payment. It is to be noted that the deficiency price payment system represented only a partial decoupling of price supports from specific commodities. The system was decoupled only to the extent that food consumers paid a market-clearing price for a given product. However, the system would still have price supports to farmers coupled with specific commodities.

The second approach was based on market-clearing prices to both farmers and consumers, but with direct income support payments to the producers. This approach was designed to decouple income support to farmers from both the demand and supply side forces of the competitive market system.

The advantages claimed for the direct income payment approach indicated the following:

- it would permit consumer choices and the broader forces of the competitive market system to allocate resources more efficiently within the agricultural industry;
- it would eliminate the need for costly storage and surplus disposal programs;
- it would be of major benefit to the lower-income food consumers;
- it would minimize interference with the international agricultural trading system; and
- it would provide greater freedom to farmers in managing their farms.

The disadvantages of the direct income payment approach to farm policy included most of those cited in connection with the Brannan Plan proposed in 1949:

- the income payments would be visible and large and would come directly from the national treasury;
- farm leaders feared that the direct income payment approach would make them too dependent on the U.S. Congress for appropriations each year, and that farmers would prefer "justice" in the marketplace, not through a government cheque;

- the high visibility and high public cost of the direct income payment approach, coupled with the continuing incentive for farmers to produce, would lead sooner or later to production and marketing quotas and controls;
- the relatively high public cost of the program would lead at some point to targeting on certain social goals, which would conflict with resource-use efficiency, e.g., the direct income payments would be targeted at smaller, lower-income farmers through the use of maximum limits on the payments; and
- even if the direct income payments approach was not commodity specific, the high subsidy element in the program could be interpreted by international competitors as an export subsidy.

While the direct income payments approach to the support of agricultural producers appeared to have several advantages over the commodity-specific type of price support program, it is interesting to note that this approach was not adopted in subsequent legislation by the U.S. Congress during the 1960s, 1970s or 1980s.

CONTINUING CRITICISMS AND DEBATE

Many studies concluded that there was a need to decouple farm price or income supports from specific commodities.

Cochrane (1958) acknowledged that the fixed price support approach solved the price instability and income problems of farmers but created an agricultural surplus problem. Cochrane noted further (p. 148):

> Granted the output-expanding force of farm technological advance under good and guaranteed prices, the point to be made here is that the government could not maintain a policy of price support at 90% of parity over any extended period with production and marketing controls no more effective than those developed in the past.

Cochrane's answer was not to decouple price supports from specific commodities, but to use rigid production controls to prevent the accumulation of costly farm product surpluses under a high price support system.

George Brandow (1955) proposed a "partial decoupling" solution to the farm problem by a "modified compensatory price program for agriculture." Under Brandow's plan, farmers would receive a direct income payment based on some marketing share (e.g., 75% of total marketings during some base period) times the difference between a specified price support level and the actual market price for a given commodity. Under his plan, market prices would not be supported nor production controlled. For any production in excess of the marketing share, the farmer would receive only the market price. Under the Brandow plan, food prices to the consumer would be those dictated by the forces of demand and supply in the competitive marketplace; for producers, resource allocation would be dictated by the "marginal price" received in the marketplace, i.e., the market price received for any production in excess of the marketing share allotted to the individual farmer.

Still other studies examined in depth the need to decouple price or income supports from specific commodities. Various forms of direct payments to agricultural producers were advocated (see Shepherd 1964, 169 ff; Severling 1959; U.S. Congress 1957, 629-86).

EARLIER EXPERIENCES IN CANADA

While the Canadian Agricultural Prices Support Act of 1944 recognized the need for some form of price support for farmers, both government and the major national farm organization, the Canadian Federation of Agriculture, recognized the dangers and consequences of commodity-specific price supports set above market prices.

For most of the life of Agricultural Prices Support Act (1944 to 1958), the federal government was cautious in terms of the level of price supports set for the designated commodities. This caution was expressed by one senior federal official (Turner 1956) who was closely associated with the operations of the act:

> In practice the Board has tended to stress the word "adjustment" and has endeavored to adjust toward a position of supply-demand equilibrium which may seem economically feasible, either in the short or long run. The attempt has been to reach a point where the product under support can eventually be left to find its own price level in the marketplace, even though a support price may be continued to protect against unusual seasonal price changes. In other words, most Board

> recommendations are made following serious consideration...about a solution too find its own price level in the marketplace, even though a support price may be continued to protect against unusual seasonal price changes. In other words, most Board recommendations are made following serious consideration...about a solution to the problem that will eventually lead to little or no government intervention in the pricing mechanism, unless a further problem develops.... Although there will be some element of welfare in any primary-industry, price-support program, it has generally been considered, in Canada, economically sounder and much more efficient and equitable to deal with the welfare problems of agriculture more directly than through government intervention in the pricing system.

It can be inferred that the Agricultural Prices Support Act, as it was administered, was designed to provide protection against "unusual seasonal price changes" and not to increase prices (in the longer run) over those that would have prevailed in a situation of "demand-supply equilibrium," i.e., the longer-run competitive forces of the marketplace. In a general sense, under the Agricultural Prices Support Act, price supports were decoupled from the influence of the marketplace on the allocation of resources in the production or consumption of any given product.

Canada's national farm organizations had conflicting reactions to the operations of the Agricultural Prices Support Act. The farm organizations did agree, however, that some type of formula should be used in setting price support levels under the act.

In 1955 the Canadian Federation of Agriculture contended that support prices should be established on the basis of a known formula. The CFA further advocated that price supports should vary from 65% to 85% of a parity price, depending on supply and demand conditions relating to the product in question. The CFA, in other words, appeared to want some form of minimum price stabilization based on a formula, but stabilization at a level that did not interfere unduly with the basic demand and supply forces of the competitive market.

The Farmers' Union by contrast advocated much greater intervention in the marketplace through price support policies, i.e., a formal, legal coupling of high price supports with specific commodities (Schwartz 1959, 161):

> At its annual convention in 1955, the Manitoba Farmers' Union supported a policy of price supports at 100% of parity for all products. In the same year the Interprovincial Farm Union Council recommended parity prices for all agricultural products consumed domestically and a reasonable schedule of floor prices...for that portion of agricultural production...it was found necessary or desirable to export.

The continuing pressure from farm organizations for a more specific formula-pricing mechanism (translated, this meant a closer coupling of farm price supports with specific commodities) led the newly elected Diefenbaker government to establish the Agricultural Stabilization Act of 1958. The 1958 ASA did provide for a formula-pricing mechanism that involved the setting of price supports for 22 named commodities on the basis of the previous ten-year moving average (originally a three-year moving average under the original version of the act passed in 1957).

Both the CFA and the Farmers' Union criticized the formula-pricing mechanism on the ground that it did not directly base farm price supports on the farmers' production costs.

In late 1958, then federal Minister of Agriculture, Douglas Harkness, warned farmers that "since his government had put price supports on 22 commodities about a year ago, surpluses had begun to build up. He warned that if they continue to build up, the price supports under them would have to be lowered" (Schwartz 1959, 177).

In March 1959, Mr. Harkness announced changes in the price support program for hogs:

- the price supports were lowered; and
- instead of supporting prices through government purchase of surplus supplies, hog producers were to be supported by a direct price deficiency payment to be determined by the difference between the actual market price received and the prescribed support price.

The Minister also announced that the direct deficiency price payment producers would "make it possible to withhold payments from commercial organizations operating under the so-called vertical integration plan, and to limit payments to any individual to a specific number of hogs delivered" (Schwartz 1959, 180).

The close coupling of price supports with specific commodities (by use of a formula) under the ASA soon encouraged surpluses in a number of other commodities besides hogs; these included butter, shell eggs, cheese, dry skim milk powder, fowl and tomatoes. The government's cost of purchasing these surplus commodities began to mount.

It was not surprising that the federal government soon found itself in the position of attempting to reduce the public costs of its price support operations.

Throughout the 1960s and 1970s, farm organizations continued to press for higher price supports for their products. This pressure mounted in the late 1960s and early 1970s as a result of general inflation in the economy.

Three general responses occurred as a result of this pressure for greater public support for the agricultural industry:

- the Farm Products Marketing Agencies Act passed in 1972 used national supply management programs and administered pricing as the means of increasing prices for producers of eggs, chickens and turkeys;
- the provinces developed their own price and income support policies for a variety of agricultural commodities; and
- the federal government amended the Agricultural Stabilization Act in 1975 to provide *inter alia* for higher price supports for those products covered by the ASA program.

It is to be noted that the supply management programs are commodity specific with respect to dairy products, eggs, turkeys and chickens. The administered pricing system and allocation of supply management quotas are tied to (coupled with) specific commodities, farmers and regions. These programs are far from "neutral" in terms of the allocation of resources within and among farms and among regions or in terms of their impact on food consumers.

The multiplicity of farm income and price support programs developed by the provinces were commodity specific and far from "neutral" in terms of the allocation of resources among the competing provinces.

The 1975 amendment to the federal Agricultural Stabilization Act coupled the commodity specific forms of price support to commodity-specific production costs, thus further complicating resource allocation among farmers, regions and consumers.

CONCLUDING OBSERVATIONS

Ever since the passing of the U.S. Agricultural Adjustment Act in 1933 and the Canadian Agricultural Prices Support Act in 1944, farm price supports have tended to become more closely coupled with specific farm commodities.

Several variations and modifications of the coupling process have been attempted in both Canada and the United States:

- flexible price support programs: actual price supports would be "flexed" up or down relative to a prescribed support level depending on supply, demand, surplus and deficit conditions in the marketplace;
- high price supports but with production or marketing quotas;
- prescribed price supports for farmers coupled with direct deficiency payments to producers;
- supply management and administered pricing;
- maximum payments to any individual farmer under direct deficiency payment programs; and
- high price supports on the domestically consumed portion of the production of any given product, with the remainder exported at prevailing market prices (sometimes reinforced with export subsidies).

Two major types of decoupling have been attempted:

- direct payments to producers under a deficiency price program, i.e., prescribed support prices for producers and market-clearing prices for consumers, the difference between the two prices being paid directly to producers in the form of a deficiency price payment; and
- direct income payments to producers instead of direct price supports.

One of the most spectacular and certainly controversial examples of a direct income support program for agricultural producers was the Brannan Plan proposed to the U.S. Congress in 1949. However, other less spectacular direct income support programs have been attempted in both Canada and the United States. While direct income support programs have operated quite successfully for a limited number of agricultural commodities or programs, there is little question that farmers in both Canada and the U.S. have rejected any attempt to develop the direct income

payment program into a more extended or universal policy for agriculture. The general response to any such attempt has been justice in the marketplace, not government cheques and handouts.

The commodity-specific types of price support programs have tended to be reinforced over time by more articulate and more highly specialized commodity group lobbies, including the American Corn Growers, the American Soybean Association, the American Hog Producers Association, the Canadian Western Wheat Growers Association, the Canadian Cattlemen's Association and the specific commodity lobby groups behind the supply management programs. The specific commodity lobby groups have become the official spokesmen for agricultural price support policies, a responsibility once carried by the national farm organizations in both Canada and the United States.

Farmers, farm organizations and governments have long recognized the difficulties that can be created in international trade and trade negotiations by the commodity-specific types of national price support programs. The current trade negotiations under the GATT, concentrating as they must on nontariff barriers to trade, are confronted directly by the need to remove those commodity-specific types of national price support programs that distort or impede trade. It is not surprising, accordingly, why the proposal for the decoupling of farm price or income support from specific commodities has taken on a new and urgent importance. The alternative is seen in the form of direct income payments to farmers.

Given the long history relating to the coupling of farm price supports with specific commodities and the many unsuccessful attempts over the past 40 years to decouple farm income support from specific commodity price supports, one cannot be sanguine that any major or easy progress will be made on this front during the Uruguay Round of the GATT negotiations.

On the more positive side, Canada has developed some programs that have a strong element of decoupling in the system. Examples include the Western Grain Stabilization Administration and crop insurance. It may be that these programs can be used as the starting point for the development of a more universal direct income payments program, but there should be no illusions about the challenges and difficulties that will be encountered in any such attempt.

In terms of the most rigid definition of the decoupling concept – a complete separation of farm price or income support from specific commodities or regions of the countries – decoupling would call for elimination or drastic modification of such existing programs as the grain transportation subsidy, the Agricultural Stabilization Act, the supply management programs and regional development subsidy incentives. At bottom, decoupling means that public support of farmers would mean direct income payments to producers while allowing market-clearing prices to allocate resources in the production and consumption of food products.

In the final analysis, decoupling is a highly political topic. Before embarking on an extensive program of decoupling in either Canada or the U.S., one would be well advised to recognize what lessons past experience might provide.

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Decoupling conference: Summary statement

T.K. Warley[1]

This symposium provided the first opportunity in Canada for a public discussion of a concept that is at the heart of the agricultural component of the multilateral trade negotiations (MTN) on agriculture – the redesign of national farm programs so as to eliminate their trade-distorting effects. It posed key questions that need to be asked about the objectives and instrumentation of Canada's national agricultural policy, and suggested areas of current policies where changes need to be contemplated if Canadian farm programs are to be trade neutral.

Although various definitions were attempted of the term "decoupling," there was no ambiguity about its essential meaning. Agricultural trade reform requires that nations retool their farm programs in ways that will break the link between the provision of income assistance to farmers and the latters' production decisions.

Nations might well contemplate separating assistance to farmers from resource use in agriculture for purely domestic reasons concerned with the expense, the failures and the perversities of present farm programs. However, the pressure to decouple support and production has arisen from discontent with the way national agricultural policies interact in the international arena.

The concept of decoupling is important to Canada in two contexts. In the Canada-U.S. free trade agreement it is imperative that a determination be made of what constitutes a countervailable subsidy if bilateral trade disputes are to be avoided or objectively resolved. In the MTN, the central task is to have countries reshape their farm programs in ways that will avoid their distorting international trade in farm and food products. The multilateral negotiations provided the major focus of the conference.

The fundamental causes of the global problems of agricultural trade were precisely identified. Governments the world over have chosen to provide most of their income transfers to farmers through the support of commodity prices. The effect is to stimulate production and to discourage consumption, thereby reducing net import requirements while enlarging net export availabilities. As a result, trade volumes, prices and flows are distorted, and the relative competitive positions of countries in international markets are changed. Halting and reversing the resultant pattern of escalating expenditures on competitive subsidization, mounting political frictions and erosion of confidence in the international trading system are the objectives in the MTN. Failure to bring about agricultural trade reform would result in failure of the Uruguay Round and could threaten the future international economic order.

Preparations for the substantive negotiations on agriculture were traced through the Venice and Tokyo Economic Summits, the OECD Ministerial Communiqué and the Punta del Este Declaration. Particular attention was paid to the commitments made in the OECD:

- to decouple support for farm people from their farming operations;
- to recouple national policy prices to international markets;
- to target the support provided to agriculture on particular groups and purposes; and
- to desubsidize agriculture to some degree by reducing the level of support provided to the sector.

Exploration of the first objective was the purpose of the conference.

It was emphasized that, conceptually, decoupling need not entail a reduction in public support for agriculture. The essential requirement is only that income be transferred in ways that have no impact on farmers' production decisions and consumers' purchases. The task was to devise ways of providing assistance to agriculture (for whatever reason and in any amount that was desired) by means that do not affect trade. Trade neutrality is the fundamental goal and decoupling the receipt of support from production is the means. An important extension of this perception is that decoupled programs need not be noncommodity-specific; commodity-specific programs would be internationally acceptable so long as they were non-trade-distorting and therefore without adverse effects on the legitimate commercial interests of trading partners. In practice, issues relating to recoupling, targeting and desubsidization are

inextricably linked in farmers' minds to the consideration of decoupling, and their attitudes toward decoupled farm assistance programs were materially shaped by the influence of the other three components of the composite agenda for agricultural policy and trade reform.

The process of reshaping national farm programs to remove their trade-distorting effects was related to the conduct of the MTN and to Canada's position in them. The use of quantitative indicators as a negotiating tool and, specifically, as a basis for monitoring progress toward agreed goals and for fixing national obligations to change agricultural policies and programs was explored. The limitations of using producer subsidy equivalents (PSE), a measure of income transfers, as a proxy measure of the trade-distorting effects of national agricultural program sets was noted. On the other hand, the inadequacy of information on elasticities was seen as a constraint on the use of more direct measures of the trade distortions caused by national policy actions. The Canadian proposal for the use of a quantitative indicator that measures only the PSE of policy instruments that are agreed to be nonneutral with respect to production (and therefore to trade) together with the provision of credits for programs that restrain output was seen as a pragmatically useful approach.

It was noted that considerable urgency attaches to the task of deciding how national agricultural policies and programs should be redesigned so as to enhance their trade neutrality. The timetable anticipated in the GATT calls for countries to table the detailed national plans by which they would implement their commitments to reduce the trade distortions produced by their agricultural policies as early as 1989. Hence, identification of candidate offers will have to begin within the coming months.

It was emphasized that Canada is not being forced to reconsider the removal of the trade distortions caused by its agricultural policies as a result of proposals by others. On the contrary, Canada is in the van of countries demanding that national agricultural policies be reshaped in ways that, by conforming to the OECD principles, would remove their harmful international effects. Canada's economic interests also require that the necessary national policy changes be translated into legally binding GATT obligations and protected by strengthened and more operationally effective GATT rules and disciplines and improved surveillance and dispute settlement mechanisms.

While Canada needs other countries to remove the trade-distorting effects of their national agricultural policies if the comparative advantage of the Canadian agri-food system is to be released, it was acknowledged that not all elements of Canada's farm policies and associated trade arrangements and behavior are neutral with respect to production, consumption and trade. Hence Canada will be unable to stand aside from the process of agricultural policy and trade reform by claiming that it has no trade-distorting subsidies. Nor can it expect to be absolved from the need to make changes in national programs by pleading "small-country" status. On the contrary, the onus is on Canada to set both an example and a standard, and to make a contribution commensurate with its stake.

In practice, the policy adjustments required of Canada are likely to be smaller and more easily accomplished than those requested of many other countries for three reasons:

- the general level of subsidization of Canadian agriculture (and hence the derivative trade impact) is lower than elsewhere;
- unlike others, Canada restrains the response to incentive prices for the most heavily subsidized commodities (dairy and feather products) by restricting supply; and
- many of Canada's commodity programs provide farmers with only low-slung economic safety nets that have minimal production (and therefore trade) effects.

In any event, the goal is to have policy adjustments made in concert in all countries and for all commodities. This will minimize the adjustments required of each country. Having regard to these factors, it might well be asked of the process of international agricultural policy adaptation: If not Canada, then who?

In addressing the task of agricultural policy reform – including the opportunities for enhancing trade neutrality by decoupling support from production – it quickly became apparent that a first step required was an examination of the status quo. What are the precise objectives of agricultural policies? Why are price-centered commodity policies so prominent a feature of national agricultural policies in Canada as throughout the western world? Why are particular policy instrument sets used? and so on.

It was sobering to find that even in a country like Canada with a long history of agricultural policy debate and analysis, precise answers to the central question of why we are doing what we do in the ways that we do it proved to be illusive. This forms a poor starting point from which to address the question that the MTN is now posing: How can we do what is essential in ways that have fewer adverse effects on world commodity markets, on our trading partners, and on the trading system as a whole?

The transfer of income to farmers was acknowledged to be a central purpose and result of agricultural policy in Canada, as elsewhere. However, a plethora of ill-formulated and sometimes inconsistent reasons for making such transfers were advanced. Significantly, some of these could require that income transfers be in some proportion to farmers' output, which would conflict with the objective of decoupling. Again, the ambiguities that attend the fundamental objectives of the policy actions that are the root cause of international agricultural market distortions provide a poor basis for directed agricultural policy and trade reform.

One possible form of decoupled support for farmers is the provision of lump sum payments unrelated to output levels. The suspicion – even hostility – to such programs expressed by farm leaders participating in the symposium illuminated the political difficulty of moving national agricultural policies in this direction. Farmers clearly have a psychological preference for receiving income transfers through "a fair price from the market," and an economic and political preference for the present covertness, level and distribution of program benefits. Farm leaders correctly perceive that transparent income transfer mechanisms would soon lead to questions about the purposes of such payments, to their targeting, means-testing and capping, and probably to a lower overall level of transfers. The interests vested in the preservation of the status quo constitute an important impediment to the adoption of decoupled income payments.

Two further difficulties of moving to a system of decoupled direct income payments unrelated to production were identified. First, given the imperatives of fiscal restraints, governments everywhere will be reluctant to replace income transfers now effected indirectly by raising consumer food prices by direct payments from national exchequers. Secondly, the provision of direct payments would force governments to confront the structural heterogeneity of agriculture, and this they seem reluctant to do.

The identification of the types of farm assistance programs that produce trade distortions emerged as a key question. Those programs that do have production and trade effects will attract countervail actions in bilateral trade, and will be the focus of policy changes undertaken in fulfillment of the internationally negotiated obligations (based on PSEs or other proxy indicators of trade distortion effects) assumed in the GATT. It was agreed that few interventions in agriculture were entirely trade neutral in the sense that output, consumption and trade would be the same in the absence of the program. On the other hand, interventions produce a wide spectrum of trade effects. At one extreme are commodity-specific price support and export subsidies that are open-ended with regard to quantity and expenditure. At the other end of the spectrum are public goods type programs (e.g., research and extension, grading and inspection), which are provided by most governments at about the same rate, and which may *affect* trade over the long run but do not normally *distort* it. Somewhere in between are commodity-specific price support and stabilization programs that have effective supply management features. Thus the degree of trade distortion induced by farm programs is a function *inter alia* of the type of instruments used, the level of support, and specific program provisions.

Ideally, this specificity of production and trade effects should be established by empirical economic analysis. In practice, the international community will probably have to adopt the theoretically flawed but pragmatically workable approach of categorizing policy instruments according to a consensual agreement on the degrees of their trade neutrality. However imprecise such an approach may be, it is likely to channel the instrumentation of national agricultural policies in the direction of production and trade neutrality and thereby to lead to a better functioning international agricultural trading system.

Two polar approaches to the reinstrumentation of farm policies were identified. They are represented in the United States by the Boschwitz-Boren and Gephardt-Harkin Bills. The first would categorically decouple the provision of farm income supports from production. The farm income insurance plan unveiled at the symposium was viewed as an imaginative and

important means by which governments could move their support for agriculture in this direction, for the proposed scheme would provide a production and trade-neutral method of meeting farm income stabilization and enhancement objectives while retaining incentives for efficiency and entrepreneurship. At the other extreme, the production stimulating and trade-distorting effects of national commodity-centered price and income support programs could be avoided by the adoption of comprehensive national supply management and international market sharing.

The first approach encounters the difficulties listed earlier, particularly producers' equation of income supplements with "welfare" payments and their fears that decoupling would inevitably be accompanied by the targeting and eventual reduction (and even termination) of assistance.

National supply management programs on the other hand have a discouragingly long list of negative features, and international commodity cooperation has a long history of failure. Moreover, the temper of the times seems to favor the deregulation of agriculture and the liberalization of international agriculture trade. The MTN on agriculture are clearly concerned to increase the market orientation of national agri-food systems and to enlarge the scope for market forces to determine the pattern of international agricultural production and exchange. At this stage, therefore, the ascendant assumptions of the negotiations on international agricultural and trade policy reform favor decoupling, deregulation and liberalization, with supply management and market sharing having only limited and transitional roles.

It was agreed that the task now to be undertaken is for each country to reexamine its agricultural policies and programs with a view to adapting them in ways that make them more trade neutral and thereby in conformity with the consensual objectives of the negotiations. Furthermore, as noted earlier, the commitment to do this in explicitly identified ways could become the basis of contractual obligations as early as 1989, so there is some urgency. Three steps are involved. First, the objectives of national agricultural policies need to be identified and specified with a good deal more precision than has been the custom heretofore. Second, the instrumentation of farm programs that are aimed at the attainment of agreed objectives need to be subject to the test of production, consumption and hence trade neutrality. Third, program instrument sets that are found to have adverse impacts on the legitimate trade interests of Canada's trading partners and on the trading system as a whole will have to be replaced by program mechanisms that will allow essential national policy objectives to be achieved in internationally acceptable ways.

The policy and program adjustments that will have to be made by Canada may be less wrenching than some fear. A very large part of the things that are done by governments for the Canadian agri-food system will readily meet any reasonable test of trade neutrality. Programs concerned with the provision of public goods, correcting for market failures, promoting rural development, the provision of adjustment assistance, protection and enhancement of the resource base, and other such socially constructive activities are not internationally controversial. Additionally, it may not be difficult to adapt two of Canada's most highly developed, commodity-specific price and income support programs (supply management and stabilization) to internationally acceptable standards. Supply management systems have the international virtue of limiting the output response to incentive prices. They could be readily made yet more internationally acceptable to Canada's trading partners in ways that would allow the essentials of the schemes to be retained. Similarly, there is empirical evidence to support the view that Canada's stabilization or safety net programs are, for all practical purposes, production and trade neutral. Indeed, it is arguable that rather than being a source of contention with Canada's trading partners, they should serve as a model that other countries might adopt with advantage. Notwithstanding this, it was acknowledged that there are other elements of Canada's farm programs that do have negative effects on Canada's trading partners, and it was agreed that urgent consideration has to be given to the options for either providing aid by other means or for providing compensation and adjustment assistance to the present recipients of their benefits.

Policy redesign would be aided by the availability of more information on the levels and distributions of the benefits and costs of present programs and alternatives to them, including impacts on farm incomes and asset values, regional effects, and the vertical effects on

agri-business of farm-level program changes. Additionally, more needs to be known about the mechanics of program adaptation and replacement and the time paths and magnitude of transition costs.

However, neither the contemplation of change nor change itself can wait on the availability of information. The task is clearly to redesign Canada's farm programs in ways that will permit the attainment of essential policy objectives by means that are internationally acceptable in the present and internationally constructive over the longer term. And the time to begin that task is now.

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